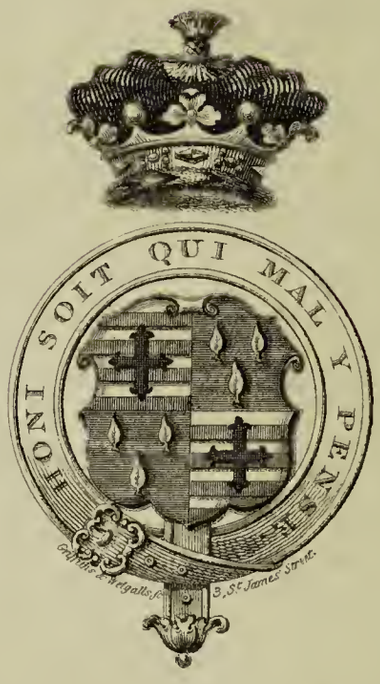
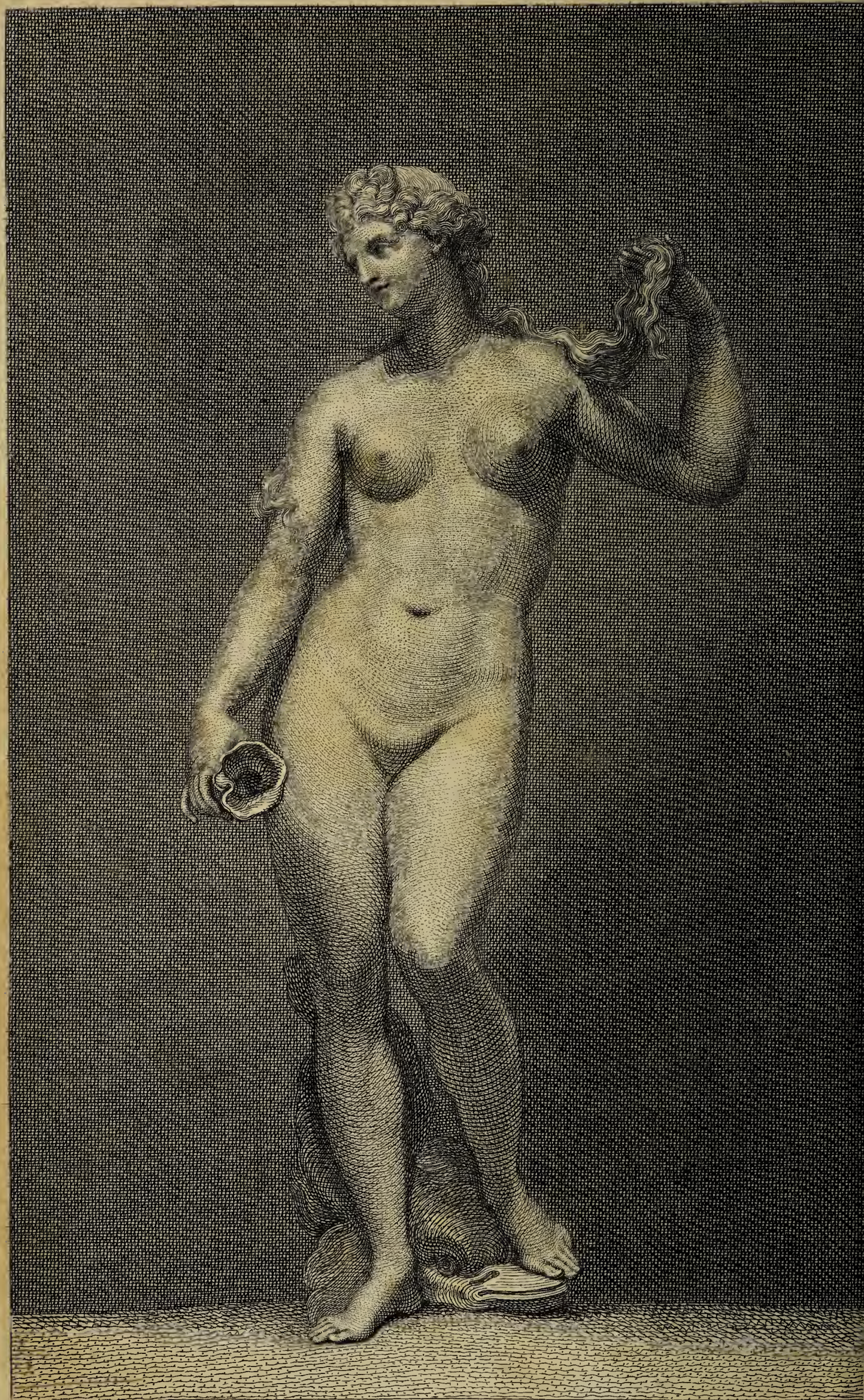


The Marquis of Stafford.



Palmer delin.

Bartolozzi sculp.

VENUS.

From a Statue by Mr. Bacon.

16766

TRANSACTIONS

OF THE

SOCIETY

INSTITUTED AT LONDON

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES, and COMMERCE;

WITH THE

PREMIUMS offered in the YEAR 1789.

VOL. VII.

LONDON:

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M.DCC.LXXXIX.

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PREFACE.

THE print of the Statue of Venus, which was intended to have been prefixed to the Sixth Volume of these Transactions, but which, from unavoidable accidents, was then omitted, being now finished, is placed as a Frontispiece to this book, and cannot fail of being highly acceptable to the Members of the Society, and to the Public in general.

The Papers inserted in the following sheets are arranged, as has been practised in the foregoing Volumes, under those heads into which the business of the Society is divided; and in the class of Agriculture it will be seen, that some Gentlemen of great

property, and of the firſt repute for learning and attention to matters of utility, are employed in raiſing Timber on the wild and hitherto barren hills of Weſtmoreland and Staffordſhire. The benefit the Nation muſt derive from ſuch ſpirited conduct and well-directed improvement is evident to the meaneſt capacity; and it is hoped ſuch laudable examples will be extenſively followed through the kingdom. Some Letters will alſo be found, ſhowing the particular advantages of the Wood of the Spaniſh Cheſnut and Larch: theſe are annexed as an incitement to the culture of thoſe uſeful trees.

A Paper on the comparative advantage of the Drill and Broad-caſt method in the culture of Grain will be found under this head, communicated by a Gentleman, whoſe Letters, inſerted in a former Volume, have been read with much pleaſure, and whoſe Obſervations in the following pages will tend to eſtabliſh a fact of the higheſt importance to Agriculture.

A Noble-

A Nobleman, whoſe account of his Plantations in Scotland, inſerted in the Sixth Volume of theſe Tranſactions, has been ſo well received, has now favoured the Society with ſome uſeful Obſervations and Trials, made to aſcertain what kind of Food for Cattle and Sheep can be cultivated to the beſt advantage. It is a pleaſing circumſtance, to find that Perſons of high rank and affluent fortune are applying their time and attention to matters of ſuch importance and utility.

Every traveller obſerves, that the quantity of Waſte-Lands in this kingdom is a diſgrace to the Country. The Improvement therefore of Waſte-Moors has long been an object of the Society's attention; and two Papers in this Volume will ſhow, that at length ſuch Improvements are advancing to the great benefit of the Nation, and that the rewards offered by the Society will in time have the deſired effect.

Schools have been eſtabliſhed in different parts of Europe, wherein the Diſorders of Sheep, Cattle, and Horſes, are particularly attended to; and perhaps few things would be of more public advantage, than the aſcertaining with preciſion the nature of the Diſeaſes to which Animals ſo uſeful to Man are liable, and thereby deducing a rational method of Cure. On this ſubject two Papers will be found in this Volume, which, it is hoped, will induce other Gentlemen to follow the examples now ſet before them, and apply their attention and abilities to ſo uſeful and humane a purpoſe.

The Diſcovery of any Subſtance not uſually applied as a Manure to land, but which will anſwer that purpoſe, is an important object to the Farmer; and there is reaſon to think, that the Letter on the uſe of the River Conferva may prove of conſiderable advantage.

It is matter of regret, that at a time when experimental Chemiſtry ſeems to be cultivated with great diligence and attention, the Society have not, this year, received any Papers under the claſs of Chemiſtry that have been judged proper for publication.

In the claſs of Polite Arts is inſerted a deſcription of a commodious Memorandum Book for the uſe of perſons deprived of Sight. This, with the Papers and Prints inſerted in the foregoing Volumes, will form as complete a Collection of ingenious Inventions as can well be hoped for, to alleviate the misfortune with which the Blind are afflicted.

In the claſs of Manufactures ſome Improvements appear to be made, and others more eſſential pointed out, towards perfecting the making of Paper from Raw Vegetables; and if hereafter thoſe refuſe materials ſhall be found to produce a better kind of Paſte-board, or Mill-board,

for the Covers of Books than is now manufactured here, the intention of the Society in offering the Premiums for aſcertaining the uſes of Raw Vegetables in making Paper, of which the conſumption is daily increaſing, will be fully anſwered.

That ſort of Paper alſo, called Marbled Paper, which was formerly wholly imported from abroad, is daily improving here; and, for elegance of Pattern and variety of Colours, now equals at leaſt any of foreign manufacture.

Under the head of Manufactures are inſerted, two Letters from the Rev. Mr. Swayne, whoſe Papers, in the Fifth Volume of theſe Tranſactions, have been ſo well approved; together with a Plate of an Apparatus, ingeniouſly contrived, for breeding and rearing Silk-Worms: and it now ſeems evident, that if Mulberry-Trees were planted, and by that means a ſufficient ſtock of Food provided for the Worms, Silk might be

be produced in England, equal in quality to any imported from Italy or the Eaſt-Indies.

As the Spinning of Cotton to the great degree of fineneſs that has been lately practiſed, has introduced into this Country the Art of manufacturing Muſlins, and other fine goods formerly unattempted in theſe kingdoms, there is reaſon to believe, that the Improvement of the art of Spinning Wool, ſo as to produce a finer thread than has hitherto been obtained, may tend to perfect ſome eſſential branches of the Woolen Manufacture. The Letters inſerted in this Volume will ſhow what attention and perſeverance have already done, and what may be expected when theſe Papers ſhall be carefully attended to by the perſons concerned in the Woollen Manufacture, and the preſent improved ſtate of Mechanical knowledge in this Country, applied to the perfecting the method of Spinning practiſed by Miſs Ives.

In the claſs of Mechanicks it will be proved, by authentic Certificates and Letters, that ſeveral large and valuable Fiſh have lately been taken by means of the Gun Harpoon which otherwiſe would have been unvoidably loſt, and that the uſe of that inſtrument is increaſing in the Whale Fiſhery.

Under this head will alſo be found, an account of an Engine or Machine for twitching Wool (an operation very diſagreable and detrimental); an attention to which, and to the Plate annexed, may be the means of remedying many inconveniencies to the Workmen, and improving the manufacture of that ſtaple commodity.

A more eaſy, efficacious, and at the ſame time leſs expenſive manner than that commonly uſed, of mending Roads, and already practiſed to conſiderable advantage, is pointed out, and a Print of a plain ſimple Machine for the purpoſe inſerted, under the head of Mechanicks. And here

too

too is ſhown, the conſtruction of a Subſtitute for a Rudder, whoſe merit is authenticated by ſuch evidence as cannot be controverted. It is with ſingular pleaſure the Society reflect on having it in their power to communicate to the world an Invention of ſuch high utility.—Every Maritime Nation muſt be happy in poſſeſſing ſo eaſy and commodious a method of alleviating the diſtreſſes of their uſeful ſubjects, in one of the moſt alarming ſituations it is poſſible for human beings to be expoſed to.

Under the claſs of Colonies and Trade, are inſerted ſome Letters on the Growth and flouriſhing State of the Cinnamon Tree in the Iſland of Jamaica. The circumſtance which led to the introduction of the Cinnamon Tree into that Iſland, has already been mentioned in the Preface to the Fourth Volume of theſe Tranſactions; and the ſeveral ſpecimens produced this year to the Society, leave no doubt of the Tree being that ſpecies from which the true Cinnamon

is

is obtained. It is with ſingular ſatisfaction the Society can conſider themſelves as having been the firſt who communicated to the Public a well-atteſted account of ſo valuable an acquiſition to our Weſt India Iſlands.

A greater number of Members have been elected this year than for ſome years paſt; and it is a pleaſing reflection, that one Branch of the Royal Family has now become a Subſcriber to this Inſtitution, and thereby ſhown a decided attention to the promoting the Arts, the Manufactures, and Commerce of theſe kingdoms, by which alone the riches and power of the Nation can be increaſed and ſupported. This increaſe of Members has enabled the Society not only to add pecuniary Rewards to ſeveral of the Honorary Premiums heretofore offered, as will appear by examining the Liſt of Premiums printed in this Volume; but alſo to offer ſome new ones, which it may not be improper to mention in this place.

In AGRICULTURE.

IT having been ſuggeſted, that the feeding Horſes on Green Food in the ſtall or ſtable would be attended with very beneficial conſequences, a Premium is offered for the beſt Account of that Practice, in order fully to aſcertain the advantages reſulting therefrom to the Farmer and the Public.

In CHEMISTRY.

A PREMIUM is this year firſt offered for diſcloſing a method of refining Block Tin; and as a far greater quantity of Tin is found in England than in any other country in Europe, it has been thought the Diſcovery of a method of Improving the coarſer kinds of that Metal, and fitting it for the finer purpoſes to which it is applicable, would be highly beneficial to the trade of the kingdom.

The

The very great conſumption of Oil in lamps rendered the Refining of Fiſh-Oil an early object of the Society's attention; and ſome Rewards have been formerly beſtowed for attempts to obtain the art, but without thoſe advantages that were expected to reſult from the encouragement given: this year therefore the Society have reſumed the ſubject, and offer a very conſiderable Premium for the Diſcovery of an effectual method of ſo purifying ordinary Fiſh-Oil, as to prevent that Incruſtation on the Wick, which extinguiſhes the light, though the lamp is fully ſupplied with Oil.

In Colonies and Trade.

The ſeveral Letters and Specimens ſubmitted this year to the conſideration of the Society, having proved that the *Laurus Cinnamomi*, or true Cinnamon, is now growing in the Iſland of Jamaica, it has been judged highly proper for the Society to

afford a due aſſiſtance to the promoting the Importation of ſo valuable an article of commerce into this kingdom, from the Iſlands ſubject to the crown of Great Britain. A conſiderable Premium is therefore now offered, to the perſon who ſhall import a quantity of Cinnamon from the Britiſh Iſlands in the Weſt Indies, and thereby introduce to this Country an article of Commerce of our own growth, which hitherto theſe kingdoms, and all Europe, have been only able to obtain through the medium of Holland.

Having thus taken a curſory view of what is contained in the following ſheets, it remains only to ſolicit the further correſpondence of thoſe Authors who may wiſh to communicate to the world at large, ſuch obſervations as may tend to improve and increaſe the Arts, the Manufactures, and Commerce of theſe kingdoms; as all Papers which ſhall be found likely to promote that

end

end will be duly inſerted in ſome future Volume of theſe Tranſactions, and the names of the Writers recorded in a manner honourable to themſelves, and beneficial to the Public.

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ERRATA.

Page 51, line 2 from the bottom, and page 74, line 8, for *Scariſbrook*, read *Scariſbrick*.

120, 6 and 16, for *Swaine*, read *Swayne*.

152, read 125.

PAPERS

IN

AGRICULTURE.

AGRICULTURE.

THE following Certificate and Letter having been received, the Gold Medal, being the Premium offered for planting Larch, was this year adjudged to the Lord Biſhop of Landaff.

THIS is to certify, That, between the 24th of June 1787, and the 24th of June 1788, I planted, for the Lord Biſhop of Landaff, at a diſtance not more than five feet, except where rocks intervened, forty and eight thouſand five hundred Larches, between two and four years old, in a field called Wansfell, near Ambleſide; which

field is well fenced with a ſtone wall, ſix feet high. Witneſs my hand,

THOMAS CLARK,

Nurſery-man at Keſwick.

Witneſs, JOHN BENSON,

Steward to the Biſhop of Landaff.

Keſwick,

Keſwick, Dec. 12, 1788.

SIR,

IN anſwer to your requeſt of the 9th inſtant—I planted, in a field called Wansfell, for the Lord Biſhop of Landaff, forty-eight thouſand five hundred Larch Firs, from two to four years old, at about four feet diſtance, except where rocks intervened; likewiſe a large quantity of Foreſt Trees, in the ſame incloſure: the whole is well fenced with a good ſtone wall, ſix feet high: in conſequence of which I did ſign a Certificate, addreſſed to your Society; and am,

Sir,

Your moſt obedient,

and humble ſervant,

THOMAS CLARK.

Mr. MORE.

In conſequence of the Society having received the following Certificate, and Account, the Gold Medal, being the Premium offered for Plantations of mixed Timber-Trees, was this year adjudged to John Sneyd, Eſq; of Belmont, in Staffordſhire.

THIS is to certify, That John Sneyd, Eſq; did plant, in land well incloſed with good ſtone walls, at Belmont, Staffordſhire, the following mixed Timber-Trees, on twenty-ſeven acres, two roods, and eighteen poles, between the firſt of October, 1784, and the firſt of May, 1786, at two, three, four, or five feet diſtance, according as the land would admit (which is a light Loam and Sand, with a mixture of Marl, and chiefly rough and ſtony); and that they are now in a thriving and healthy ſtate.

Oaks

Oaks, two years old,	tranſplanted	24,000
Ditto, three years old,	ditto	6,000
Scotch Pines, four years old,	ditto	12,600
Ditto, three years old,	ditto	31,300
Beech, four years old,	ditto	5,300
Ditto, three years old,	ditto	9,000
Spaniſh Cheſnuts, two years old,	ditto	6,000
Ditto, one year old	ditto	2,000
Larch, five years old,	ditto	6,500
Ditto, four years old,	ditto	6,500
Sycamores, three years old,	ditto	500
Ditto, two years old,	ditto	5,000
Aſh, three years old,	ditto	3,000
Ditto, two years old,	ditto	3,000
Elms, three feet, narrow-leaved	ditto	1,962
Ditto, two feet, Engliſh,	ditto	2,000
Spruce, white, one foot,	ditto	5,000
Spruce, black, one foot,	ditto	200
Limes, one foot,	ditto	100
Planes, four feet, Oriental,	ditto	100
Ditto, Occidental,	ditto	100
Lombardy Poplar, three feet,	ditto	300
Cratœgus Area,	ditto	50
Mountain Aſh, five feet,	ditto	100
Ilex, one foot,	ditto	700
Scotch Pines omitted, three years old,	ditto	200
Spruce ditto, two years old	ditto	200
Elms ditto, two years old,	ditto	300
Horſe Cheſnuts, three feet,	ditto	200
		132,212

Certified by me, this 28th of October, 1788, who remember the Plantations, as above, being made, and have lately ſeen them in a thriving and healthy ſtate.

EDWARD FERNYHOUGH,
Miniſter of Ipſtones.

Chedleton, Nov. 22, 1788.

SIR,

IN anſwer to your requeſt, dated the 12th inſtant, and received on the 20th, relative to the Plantation of John Sneyd, Eſq; of Belmont, in the pariſh of Ipſtones, and county of Stafford; I beg leave to inform you, that between the 1ſt of October, 1784, and the 1ſt of May, 1786, were planted therein one hundred and thirty-two thouſand two hundred and twelve Foreſt-Trees, for Timber, as repreſented to me; and I, having ſeen the ſaid Plantation and Fences, did certify it to the worthy Gentlemen of your Society.

I am, Sir,
Your moſt obedient ſervant,
EDWARD FERNYHOUGH.

Mr. MORE.

The

The Thanks of this Society were voted to Mr. W. Jones, of Foxdown-Hill, near Wellington, Somerſet, for the following Obſervations on the Uſes of the Wood of the Spaniſh Cheſnut Tree; and Mr. Jones was acquainted, by Letter, That the Society, ſenſible of the Utility of the Wood of that Tree, have, during many years, offered Premiums to encourage the Growth of it; and a Copy of the ſeveral Advertiſements on that head were ſent to him.

SIR,

December 4, 1788.

SIR,

HAVING lately built a Houſe, I had occaſion to buy a great part of the timber; and knowing a Friend of mine to have ſome Spaniſh Cheſnut Trees of a large ſize (one of them ſquared upward of two feet) I bought ſeveral of them, and uſed the timber for various purpoſes, inſtead of Oak; and finding ſome of it very ſound, and finely variegated, I reſerved it for Doors, and Balluſtrades of a Stair-caſe; and gave them a colour (by rubbing them over firſt with Alum-water, then laying on, with a bruſh, a Decoction of Logwood Chips; and, laſtly, a Decoction of Brazil Wood) equal to Mahogany. It is not my opinion only; for both the Doors and Balluſtrades have been frequently taken for Mahogany; and every perſon who ſees them is ſure to admire them.

them. This timber being ſo valuable for theſe purpoſes, (for it is acknowledged, by every perſon I have converſed with about it, that it is leſs liable to warp than any other timber) I became very deſirous to be informed of its utility when expoſed to the weather; and inquired of my Carpenter, if he ever knew it proved? He replied, That he did; and believed it, in every reſpect, equal to Oak; and could ſhow me (in the pariſh in which I reſide) Gate-Poſts of the Spaniſh Cheſnut, which when I ſaw, I ſhould be convinced, as well as he was, of the utility of this wood for ſuch purpoſes. He informed me alſo, that, in or about the year 1763, (full as long ago) he worked with his Father on this Farm, to repair the Gates and Gate-poſts; ſome of the Poſts were of Oak, and others of Spaniſh Cheſnut; that the latter had the appearance of being put in at the ſame time with the Oak, but were more ſound, in ſo much that ſome of them were adjudged good enough to remain as Gate-poſts, and are now to be ſeen there:

there: ſuch of them as were too ſmall to continue for Gate-poſts, were then taken up, and put into the ground, for Poſts to fix rails to, for Fence of a Maw-Barton, on the ſame Farm. He at the ſame time put in alſo ſome new Poſts of Oak (to fix ſome of the rails to), there not being enough of the old Poſts of the Spaniſh Cheſnut. On receiving this account, I could not reſiſt the inclination I had to ſee the Poſts he ſpoke of; and, within a week paſt, I took the opportunity, and can aver that, though the Spaniſh Cheſnut were *old* Poſts when put in, twenty--five years ago, they appear to me to be more ſound than thoſe of Oak which were put in new at the ſame time. I obſerved that one ſide of one of the Spaniſh Cheſnut Poſts was the outſide of the Tree, from whence the Bark is of courſe gone; but the Timber is as perfectly ſound there as in any other part; which would not have been the caſe with Oak, the Sap of which, next the Bark, ſoon decays. This Carpenter is ready to make

an

an affidavit, that he put in theſe old Spaniſh Cheſnut Poſts full twenty-five years ago; and alſo that his Father (who has been dead about five years) had often told him, that he did the work conſtantly on this Farm from the year 1745; and that the Spaniſh Cheſnut Gate-poſts on the Farm muſt have been put in many years before that period, as they appeared to be old Poſts when he firſt knew them; which proves the Spaniſh Cheſnut Poſts now ſtanding around the Maw-Barton to have been forty-three years expoſed to the weather, *viz.* eighteen years as Gate-poſts, from the year 1745 to 1763; and twenty-five years as Poſts for fixing rails to, from 1763 to this time: but how much longer they had ſtood as Gate-poſts before the year 1745, cannot be aſcertained.

I have taken Chips* from theſe Spaniſh Cheſnut Poſts, and ſhall take the liberty of

* Three Chips, marked N° 1, taken from the top of the Poſts.

Three

of ſending them to you, (by the Exeter mail-coach, which goes through Bath to-morrow) to ſhow what a ſtate of preſervation they are in: and have only to add, that I have every reaſon to believe this account of their being expoſed to the weather the length of time before repreſented; and ſhall be very happy if theſe Obſervations ſhould be thought worthy the attention of ſo reſpectable a Society, inſtituted for ſuch laudable purpoſes; and tend to promote the propagating of this Timber, which cannot fail of being highly beneficial to poſterity.

I am,

Sir,

Your moſt obedient ſervant,

W. JONES.

Mr. MORE.

Three Chips, marked N° 2, taken from the ſide of the Poſts, and plainly appearing to have been the outſide of the Tree, from whence the Bark is gone.

Theſe Chips remain in the Society's Repoſitory, for the inſpection of the curious.

In the Sixth Volume of theſe Tranſactions is inſerted a particular Account of ſome Experiments, made on a large ſcale, by Mr. John Boote, of Atherſtone upon Stower, to determine the comparative advantage of The Drill and Broad-caſt Huſbandry; for which the Gold Medal was adjudged to him.—This year the following Letter having been received, the Gold Medal (the Premium offered on that ſubject) was again adjudged to Mr. Boote; and it is hoped the following Paper will be found to contain very ſatisfactory information on a buſineſs that has ſo long divided the opinions of ſome of the moſt attentive and enlightened Agriculturiſts in theſe Kingdoms.

SIR,

SIR,

AS my former accounts of Experiments comparatively made between Drilling and Broad-caſting, in order to diſcover which was the moſt advantageous method of cultivating Land, have met with a favourable reception by the Society of Arts, Manufactures, and Commerce, I am induced to lay before them a further ſtatement of my ſucceſs in Drilling, upon a ſcale of three hundred and twenty-three acres, in the year 1788 (which makes the third year of my practice at large, in the Drill ſyſtem, upon my Farm) *viz.* Wheat ſeventy, Barley ninety, Oats ſeven, Beans fifty-two, Peas twenty-eight, Turneps ſeventy, Cole ſix acres.

The comparative Experiments which I made in the year 1787, between Drilling and Broad-caſting four acres of each with Wheat, was upon cold Clay, that being the

the only ſoil upon which I entertained at that time any doubts of the Drill Syſtem having a ſuperiority over the Broad-caſt; and having repeatedly and ſucceſsfully derived an uniform ſuperiority in favour of Drilling, on light ſands and dry loams, it was my intention never to give myſelf the trouble of repeating a comparative experiment on ſuch ſoils: but, reflecting on the attention which the Society have paid to my former Letters on the ſubject of Drilling, by giving them a place in their Tranſactions; and conſidering that the Society, by continuing to offer a Premium for the comparative culture of Drilling and Broad-caſting, was deſirous of ſtill further experiments than thoſe I have already communicated; I determined to ſacrifice the profits of ſixteen pounds, which, from the reſult of former experiments, I had reaſon to believe I ſhould loſe, by ſowing four acres broad-caſt, to the pleaſure and ſatisfaction I might have in furniſhing the Society with the reſult of a comparative experiment between

Drilling and Broad-caſting four acres of each upon a ſandy loam, agreeably to the terms propoſed by the Society for making ſuch aſcertainment.

Accordingly I fixed upon a twenty-acre piece, which was trench-ploughed for a turnep-fallow in the beginning of November, 1786, and dunged about Chriſtmas following; afterwards ploughed three times, at proper intervals; alſo harrowed occaſionally, and drilled with turneps, in rows twelve inches apart: the turneps were well hoed three times, and produced an exceeding good crop; which was eat off by ſheep in Autumn: the land was afterwards trench-ploughed, four acres of which were drilled with four buſhels of wheat; the ſame day four acres adjoining (the ſoil as ſimilar as poſſible) were ſown broad-caſt with ten buſhels of wheat, in order to make the comparative experiment.

In the firſt week of April, 1788, the drilled wheat was hoed, and repeated the laſt

laſt week in the ſame month; at which time the broad-caſt was alſo hoed, with hoes of a proper ſize for the purpoſe, in order to give it every advantage: at harveſt the crops of the reſpective four acres were ſeparately reaped, each laid by itſelf in the barn, and ſeparately thraſhed, in order to aſcertain, with the greateſt accuracy, the difference of each produce. The reſult as follows; which alſo appears in the numbers 14 and 15 of the next aſcertainments.

Produce of four acres Drilled, one hundred and nineteen buſhels, one gallon, and four pints; produce of four acres Broad-caſt, ninety-four buſhels, two gallons, and four pints—difference in favour of Drilling, twenty-four buſhels, ſeven gallons, which, at five ſhillings and ſixpence per buſhel, together with ſix buſhels of ſeed ſaved by drilling, which coſt me ſeven ſhillings and four pence halfpenny per buſhel, amounts to nine pounds one ſhilling and three farthings. Deduct the extra-expences

of drilling four acres at ſixpence, and extra-hoeing at eighteen pence per acre, amounting to eight ſhillings, the net profit in favour of Drilling will be eight pounds thirteen ſhillings and three farthings, or two pounds three ſhillings and three pence per acre.

From the apparent diſproportion between the real advantages in favour of Drilling, as above, and my apprehenſion, in a former Letter, of loſing ſixteen pounds by ſowing four acres broad-caſt, it may at firſt ſight be inferred, that I muſt have been very much miſtaken in my calculations reſpecting the real advantages of Drilling, compared with thoſe of Broad-caſting; on which account I have to obſerve, that toward the latter end of April, 1788, when the four acres drilled, three weeks after it had been hoed, gained ſuch a decided ſuperiority over the adjoining four acres broad-caſt, which was ſelf-evident by the ſtrength of the plants, and being of a darker green, that I determined to give the Broad-caſt every advantage:

tage: accordingly I had it as well hoed as was practicable to be done; which is, in fact, doing all that can be done for any broad-caſt crop: this evidently improved the four acres broad-caſt; otherwiſe I am decidedly of opinion, that, in caſe the hoeing of the four acres broad-caſt had not taken place, but the weeds had been ſuffered to grow, the four acres drilled would have exceeded the four acres broad-caſt more than one third; from whence I cannot ſee that I have any reaſon to make the leaſt abatement reſpecting my aſſertions in a former Letter, that I was apprehenſive I ſhould loſe ſixteen pounds by ſowing four acres broad-caſt. Hoeing of broad-caſt corn is nothing new with me, or others; it is commonly done in Berkſhire, and other places; and was my uniform practice for twelve or thirteen years of my broad-caſt farming: but as it cannot be performed ſo effectually in a broad-caſt crop as in a drilled one, it is unreaſonable to expect equal advantages from it, ſince, after all the care and pains that

can be taken in hoeing a broad-caſt crop, there will be many weeds left growing, being ſo mixed and interwoven with the corn, as not to be cut up without cutting up the corn alſo. I muſt own, that neither the produce of the above four acres drilled, nor the produce of the four acres broad-caſt, came up to my expectations, conſidering the due preparation of the ſoil. This I attribute entirely to the dryneſs of the ſeaſon: there is nevertheleſs this inference to be drawn from it, That in whatever proportion any drilled crop may ſuffer in a dry ſeaſon, for want of moiſture, the broad-caſt crop will ſuffer ſtill more, by reaſon of the ſeed being depoſited at improper depths; for the plants of thoſe ſeeds in particular which were ſown too near the ſurface of the land, will be almoſt parched up for want of moiſture in a dry ſeaſon.

In my attempts to aſcertain the difference between Drilling and Broad-caſting, I am ſomewhat ſurpriſed it ſhould never occur to

me

me before now, to aſcertain the difference in quality as well as quantity of grain produced from both methods of culture, by weighing equal quantities of each. In the above comparative experiment the Drill has no material advantage over the Broad-caſt; a buſhel of the latter being nearly equal in weight to a buſhel of the former: this I attribute to the circumſtance of the broad-caſt crop being hoed, particularly as my neighbour Mr. William Greenway informs me, that, from the reſult of his experiments of laſt year, in order to aſcertain the difference between Drilling and Broad-caſting, the grain of his drilled crop was ſuperior to that of his broad-caſt, not only in quantity, but alſo in quality, two pounds weight per buſhel; and his broad-caſt crop was not hoed: from whence I conclude, that the grain of his broad-caſt crop was imperfectly vegetated, and not brought to full maturity, by reaſon of the injury done to it by the weeds, or for want of the ſoil being pulverized by the hoe.

In one of my early experiments in Drilling, I found that hoeing the intervals between the rows or drills was indiſpenſably neceſſary; otherwiſe, where land was foul with weeds, or caked upon the ſurface, ſo as to exclude the air from the fibres of the plants, or hinder the extenſion of the fibres in the ſoil, the advantages of Drilling were, upon the whole, not worthy of notice. On the contrary, and by the ſame experiment, I found that, by hoeing the intervals, cutting up the weeds, and pulverizing the ſoil at ſeaſonable times, a ſurpriſing and almoſt incredible advantage might be derived: this left me no alternative but that of declining the Drill Syſtem altogether, except for beans and peas, at wide diſtances, where the horſe-hoe, or ſhim, might work; or of ſubmitting to the formidable expence of hand-hoeing the intervals of drills at nearer diſtances. To the advantages gained by hoeing, I was at that time no ſtranger; and I was not long in finding out that the value of ſeed ſaved by Drilling, would more than defray the expences of hoeing; and the

hoeing,

hoeing, I was confident, would inſure a ſuperior crop: from whence I concluded that the only obſtacle that lay between me and ſucceſs, in the Drill Syſtem, upon a large ſcale, was the difficulty, if not the impoſſibility of procuring a ſufficient number of labourers to perform the buſineſs of hoeing, juſt at the time required: and, as I apprehended, ſo it has turned out: the difficulty in procuring a number of hands in due time, and, in tickliſh ſeaſons, perhaps at an hour's notice, is very conſiderable; excluſive of the attention required in ſeeing that the work was done in a huſbandmanlike manner, and the fear of the crops of corn growing too high to admit of the uſe of the hoe: the weeds at the ſame time committing ſuch horrid depredations, without a poſſibility of retrieving the loſs, muſt needs create no little anxiety of mind.

Anxious, however, as I may have been, at intervals, on this account, for three years laſt paſt, I have now the pleaſure of ſaying, that all the above fears and anxieties,

anxieties are done away, being now in poſſeſſion of an inſtrument, viz. a Horſe-hoe, the ingenious invention of the Rev. Mr. Cooke, to whom a large ſhare of public praiſe is certainly due, not only for this inſtrument, and his improved Drill, but alſo for his ſpirited exertions, and indefatigable labour, in introducing the Drill Syſtem at large. Of the utility of the above Horſe-hoe I am inclined to entertain a very high opinion, having already tried it upon a piece of drilled wheat; and find that the Inventor has, by a moſt ſimple contrivance, enabled the perſon who attends the inſtrument, to guide it ſo as to avoid cutting up the rows of corn. Its effects appear to be ſuperior to thoſe of Hand-hoeing; and, ſo far as I have experienced, I have reaſon to believe that two men, or one man and a boy, with two horſes, working alternately, will effectually hoe ten acres a day.

It is not uſual with me to decide haſtily and prematurely, for or againſt any inſtrument

ment not yet ſufficiently tried: I am nevertheleſs inclined to think, that by this invention the Drill Syſtem will ſoon be brought to perfection, at leaſt to ſuch a degree of perfection as to enable every huſbandman of common capacity only, to underſtand and practiſe it.

I am,

SIR,

Your moſt humble ſervant,

JOHN BOOTE.

Atherſtone upon Stower,
near Stratford upon Avon,
Jan. 31, 1789.

Mr. MORE.

ACCOUNT

Account of the different Sorts of Grain produced from Seed ſown by the Rev. Mr. Cooke's Drill Machine, on the Eſtate of Mr. John Boote, of Atherſtone upon Stour, near Stratford upon Avon, in the County of Warwick, in the Year 1788.

		Land meaſured. A.	R.	P.	Produce of the Land meaſured. Buſh.	Gal.	Pints	Produce per Acre. B.	G.	P.
N° 1.	Beans drilled upon loamy ſand, after barley	0	1	12	13	5	6	42	1	5
2.	Ditto ditto ditto	0	1	14	12	6	6	38	0	3
3.	Barley, drilled upon loamy ſand, after turneps	0	2	36	44	5	4	61	5	0
4.	Barley, drilled upon ſandy land, after peas	0	1	13	17	3	5	52	5	4
5.	Ditto ditto ditto	0	1	15	22	7	1	66	4	5
6.	Ditto ditto ditto	0	1	35	29	3	5	62	6	5
7.	Beans drilled upon ſand and mixed ſoil, after barley	0	1	27	18	4	2	44	2	0
8.	Peas drilled upon marl, and mixed ſoil, after wheat	0	2	10	17	7	0	31	6	1
9.	Ditto ditto, upon mixed ſoil, after wheat	0	0	38	10	0	3	42	2	3
10.	Wheat drilled upon marl and mixed ſoil, after clover	0	1	1	7	4	5	29	4	4
11.	Ditto, upon clay and mixed ſoil, after fallow	0	0	31	6	0	4	31	2	2
12.	Wheat drilled upon loamy ſand, after clover	0	2	7	22	3	5	41	2	2
13.	Oats drilled upon loamy ſand, after turneps	0	2	35	44	5	4	62	1	3
14.	Wheat drilled upon loamy ſand, after turneps	4	0	37	126	1	1	29	6	3
15.	Wheat ſowed broad-caſt, upon loamy ſand, after turneps, and adjoining the drilled in the ſame ground	4	2	11	107	6	2	23	4	5

The above land was meaſured, and the workmen examined, by me

JOSEPH BARBER.

Wimpſtone, near Stratford upon Avon,
Jan. 28, 1789.

The Thanks of the Society were ordered to the Right Honourable the Earl of Fife, for the following Communication reſpecting the trials, made under his Lordſhip's direction, of the Mangal Wurzel, or Root of Scarcity, Turneps, Carrots, and Turnep-rooted Cabbage, as food for cattle.

Whitehall,

Whitehall, Feb. 23, 1789.

SIR,

I WAS very desirous to encourage the cultivation of the Mangal Wurzel, or Root of Scarcity, as it was recommended by respectable authority.

I thought it best to try it on my own farm before I recommended it to my farmers. I purchased the seed from Mr. Eddie, in the Strand; and sent it, with the printed book of directions, with orders to follow them exactly; which was accordingly done, as far as the season would permit. It was the end of March when the seeds were sown in a warm border in the kitchen-garden: it was transplanted into a field, in fine order, about the beginning of May; and, for the four following months, hand-hoed, and kept perfectly clean. The produce has not answered expectation; the leaves were only twice gathered; and when the

the roots were taken up, the average weight was only from three to four pounds: about one hundred ſeeds, indeed, were ſown in the hot-houſe, and tranſplanted to a border in the garden, in April; and the roots produced from them weighed from nine to ten pounds each, when taken up in November. On ſo ſmall a ſcale, and in ſuch a ſituation, no judgement can be formed of its value. In the ſame field where the Root of Scarcity was planted, there was an acre of Carrots, an acre of Turnep-rooted Cabbage, and ten acres of common Turnep: I ordered the produce of one hundred ſquare yards, of each kind, to be weighed; found the weight to be as follows:

	Stone	lb.
Common Turneps, weight	92	4
Carrots . . .	95	0
Root of Scarcity . . .	77	0
Turnep-rooted Cabbage . .	88	0

The Turnep-rooted Cabbage was planted in lines twenty inches apart; the Common Turnep,

Turnep, ſown broad-caſt. The Carrots were alſo ſown broad-caſt, and hand-weeded; by which means they were very thick; not more than three or four inches apart when full grown. You will obſerve, this experiment, with reſpect to the weight and produce, makes againſt the Root of Scarcity: I am confident it is alſo inferior in the nutritive quality. The hand-pulling the leaves is expenſive; and this happens at a time when all other vegetables are in perfection. I ordered two cows to be fed ſix weeks on Turneps, two alſo on Turnep-rooted Cabbage, and two on the Root of Scarcity: the dairy-maid, in order to aſcertain the quantity that each cow gave, meaſured the milk when they were put up: ſince that time ſhe has meaſured it every two or three days: ſhe finds that the cows fed on the Common Turnep give moſt milk, that thoſe on the Turnep-rooted Cabbage the next, and thoſe on the Root of Scarcity the leaſt: the milk however of the cows fed on the Root of Scarcity has no bad taſte. There is no crop that has been tried on my farm,

farm which anſwers ſo well as Carrots: my work-horſes have been fed on them, at the rate of two pecks each a day, when they had no corn, and little more than half the uſual quantity of hay given to them; the horſes were kept at work every day from ſeven to eight hours, and were never in better order. I ſhall be glad that you lay this before the Society, if you think it merits their attention.

I have the honour to be,

With great reſpect,

SIR,

Your moſt obedient

humble ſervant,

FIFE.

Mr. MORE.

THE following Certificate and Letter having been received, The GOLD MEDAL, being the Premium offered for the cultivation of the *Rheum Palmatum*, or true Rhubarb, was this year adjudged to Mr. JOHN BALL, Surgeon, at Williton, in Somerſetſhire.

THIS is to certify, That John Ball, Surgeon, in Williton, in the pariſh of St. Decuman's, and county of Somerſet, hath raiſed this year upwards of four hundred plants of the Rheum Palmatum, or true Rhubarb; that they ſtand ſix feet aſunder each way; that they have been in a very thriving ſtate during the preceding ſummer, in a ſouthern aſpect, and ſandy ſoil: the culture, one part good rotten dung, and two parts rich earth from the gutters in watered meadows (having been thrown together for two years, and often turned); two parts old cobb (alias mud-wall), and ditto of ſifted coal aſhes; and in order that the roots ſhall

have a ſufficient depth, each plant is ſet in a hole, dug three feet deep and three feet wide, and filled with the above manure well mixed together.

G. KNYFTON, Miniſter.

ROBERT DORE,
RICHARD MORLE, } Church-wardens.

Williton, near Watchet,
Somerſetſhire, Nov. 1, 1788.

JOHN TREVELYAN,
Nettlecombe, near Taunton.

HENRY TRIPP,
Orchard-Wyndham, near Williton.

SIR,

YOUR favour, dated Adelphi, Feb. 18, 1789, found me at Williton, Sunday the 22d, where I was on duty, it being a chapel

of eaſe to the church of St. Decuman's. I ſigned Mr. Ball's Certificate, imparted to him the contents of your Letter, and was referred to his ſervant, William Gibbs, for information; the reſult of which was—that he (Gibbs) not only ſuperintended, but executed the greateſt part of the work relative to the ſaid Rhubarb—that the quantity of manure was two teams of dung to each pit, value three pence per team;—conſequently the manure for four hundred and thirty pits, in which the ſaid number of plants were placed, coſt ten pounds fifteen ſhillings; and that every twenty pits coſt him in digging one ſhilling and three pence: and he farther adds, that he is at this time giving them a freſh dreſſing of good rotten dung. This, I believe, fully anſwers the requiſition made by you to

Your humble ſervant,

GEORGE KNYFTON.

Williton, Feb. 24, 1789.

St. Decuman's, Taunton, Somerſet.

Mr. MORE.

THE

THE improvement of the waſte Moor Lands in this kingdom is an object of ſuch great importance, that the Society has long conſidered it as a fit ſubject of their encouragement and reward.

The annexed Account, which was received laſt year, not entirely agreeing with the conditions publiſhed in the Society's advertiſement, the Gold Medal, being the premium offered, could not be adjudged to the candidate; but in conſideration of the merit of the claim, the SILVER MEDAL was voted to MATTHEW STEPHENSON, of Smardall Hall, Weſtmoreland, Eſq. the proprietor of the land, for the following communication.

ACCOUNT *of the Improvement of three hundred and twenty-five acres of* MOOR LAND, *lying in the parishes of Asby-Ormside, and Warcop, in Westmoreland, and let from eighteen pence to two shillings per acre in its natural state. The soil, a light mould, from five to seven inches deep; substratum, a strong yellow clay; the natural produce a strong benty grass, mixed with a stinted ling: the whole divided into twenty-one fields, from ten to nineteen acres, planted with Whitethorn.*

NO. 1 and 2, about thirteen acres each, were pared and burned in 1778, the ashes spread, and ploughed lightly in, and well harrowed and sown from the 1st to the 8th of August with two bushels of clean-dressed hay-seeds, and three pounds each of red clover, white clover, and hop clover, and four pounds of rib-grass to an acre: the seeds flourished during a severe winter, and both

fields

fields were mowed the following year, and produced a very luxuriant crop, computed at near two tons per acre, and about thirty buſhels of hay-ſeeds per acre; the ſecond year they were again mowed, and the produce about two thirds of the former year, but equal in value, the hay being much finer. The fog or after-graſs was ploughed in, to tender and meliorate the ſtubborn furrow by the winter's froſt, and in the ſpring ſown with oats. The crop tolerable, ſomething more than thirty Wincheſter buſhels per acre.

The ſtubble was ploughed in, ſhallow, before the winter, and the land fallowed the next year (the fourth), and limed with forty buſhels to an acre, and ſown on the 2d, 3d, and 4th of September, part with different kinds of wheat, and part with meſlin, (which latter was the beſt); this early ſowing was ſuppoſed to be the proper ſeaſon in a cold country, and this opinion was afterwards confirmed by repeated trials. In the ſpring (fifth year), clover and hay ſeeds, as

above, were ſown in the wheat, but rather more rib-graſs, which ſucceeded the beſt: the produce was greatly beyond expectation; but the hardy cone wheat, rough eared, was the beſt of the wheat, yielding rather better than twenty-five buſhels per acre; the other wheat, twenty-two buſhels, on an average; and the meſlin, twenty-eight buſhels. Sixth, ſeventh, and eighth years, the graſs was allowed to be very good, and generally conſidered worth twenty ſhillings per acre.

No. 3 and 4.—Fourteen, and ſeventeen acres were pared and burned in 1779. No. 3 was ſown with turneps, which were ſmall, the ſeed laying in the ground five weeks without rain; ſecond year oats, very indifferent: this confirmed an opinion, that in this ſoil there is a faintneſs at firſt breaking-up, which is injurious to corn. Third year fallowed and limed forty buſhels to an acre, and ſown in the firſt week of September with cone wheat, and in the ſpring with

with graſs ſeeds and clover as before. The crop of wheat was very extraordinary, paying at the low price of four ſhillings and ſixpence per buſhel above ſix pounds per acre. 1783, 1784, 1785, continued in graſs, and then ploughed up again for corn.

No. 4.—Seventeen acres were managed as No. 1 and 2. The ſeaſon being dry, the turfs were well burnt, and produced plenty of aſhes, and were ſown down, on the 6th and 7th of Auguſt, with twelve buſhels of hay-ſeeds, two pounds each of red, white, and hop-clover, and ſix pounds of rib-graſs, (thriving the beſt, as before obſerved); the crop was much beyond No. 1 and 2. Ninety two two-horſe cart loads were led out of the field, and made into a ſtack, or rick, ſeventeen yards long, five yards broad, well furniſhed, and computed at forty ton, and produced near forty buſhels to an acre of hay-ſeeds. This field was a very good paſture for four years, when moſt of the clover being worn out, it was ploughed up for

for oats. It would be tedious, and perhaps unneceſſary, to give a circumſtantial account of all the other fields, and may ſuffice to ſay, the whole three hundred and twenty-five acres are now in cultivation, and raiſed to above four times the value, being let at nine ſhillings per acre, on an improvable leaſe: two compleat farm-houſes have been built, with all neceſſary convenience, on this improved land.

The reſult of this improvement ſeems to be, that, beginning with hay-ſeeds, and different kinds of clover, ſown on the ploughed-in aſhes, is greatly the moſt profitable—whether paring or burning is generally a good practice, ſeems to be a doubtful matter: but the doubts probably ariſe from the ſubſequent management uſually followed after this operation, in over-cropping the land; for, as to the idea of diminiſhing the ſoil, it is ſuppoſed to be erroneous, and that ſoil cannot be reduced by fire; however, it can ſcarce admit of a doubt, that paring

and

and burning this benty, coarſe graſs, is the quickeſt and beſt method of reducing its tough ſward, and preparing it for cultivation; and when ſown down with graſs-ſeeds on the aſhes, never failed to produce great crops for three or four years; and that by following this method, viz. Firſt three years, graſs; next three years, two crops of corn, with an intermediate fallow, very profitable crops are produced on land, by nature of little value; and it is manifeſt in the above improvement, that by purſuing this method the crops have increaſed in goodneſs.

N. B. No dung was uſed in this improvement, except on one field laſt year for wheat for a trial, which of courſe had a great effect. The manure produced by the crops was applied to the improvement of the old incloſures, by which a double benefit was gained.

IT is impoſſible to teſtify to every particular of the above, without reſiding conſtantly on the ſpot; but the underſigned ſaw the crops on the ground, which well merited the above account given of them, eſpecially the graſs, which was very extraordinary: to the number of acres we can certify, having compared the fields with the plan of the eſtate; alſo, that the improvement was performed without dung, with one exception.

HUGH ATKINSON, Miniſter of Great Aſby,
RICHARD BOURFIELD, of Ormſide.

WILLIAM BARNET.

March 26, 1788.

THANKS

THANKS were returned to THOMAS WHITE, of Retford, Nottinghamſhire, Eſq. for the following communication relative to the growth of the Larch in the northern parts of theſe kingdoms.

SIR,

IN my letter to you of the 12th, I propoſed deferring my obſervations upon the Larch Tree, till the many different experiments which I am now making are more matured; in the interim, cannot deny myſelf the pleaſure of laying before the Society, an account of ſome of the oldeſt and largeſt Larch Trees in Britain, which I have this day received from a very ingenious and ſpeculative gentleman, Mr. Drummond, of Blair

Blair Drummond, in Scotland, ſon to the late Lord Kaims: ſhall be happy if it be acceptable.

I am,

SIR,

Your moſt obedient ſervant,

THOMAS WHITE.

Retford, Feb. 17, 1788.

Mr. MORE.

SIR,

WHEN I had the pleaſure of ſeeing you here in November laſt, you beſtowed ſo many handſome compliments upon my Larixes, that I ſhould be ungrateful if I neglected to perform the promiſe I then made of ſending you the dimenſions of

of the largeſt one, which you now have noted below.

	Feet.	Inch.
Circumference, one foot from the ground, clear of roots	9	6
Ditto, three feet from ditto -	7	6
Ditto, ſix feet from ditto -	6	6
Ditto, nine feet from ditto -	6	1
Ditto, twelve feet from ditto -	6	0½
Ditto, fifteen feet from ditto -	5	9
Ditto, thirty-five feet from ditto	5	1
Ditto, fifty-five feet from ditto	4	9
Ditto, ſeventy-five feet from ditto	3	9
Height to the extremity of top -	97	0
Cubic contents, - -	130	0

The above dimenſions were taken with all the attention poſſible, and are perfectly accurate. This tree is one of ſix that were planted in the year 1734; four of theſe, which are ſtill growing in the neighbourhood of the above one, are all fine trees, although none of them altogether ſo large as it is.

It

It is worthy of remark, that the ſoil in which theſe trees are produced, is a light mould, not above ſix inches deep, below which there is nothing but pure ſand. With a view to form a proper judgment of the quality of the wood, about a twelvemonth ago I cut down the worſt of theſe ſix trees, and had it ſawed into planks, a piece of one of which, you may recollect, I ſhewed you when here. I have ſince had ſome pieces of furniture made of it; and it is the opinion of every perſon of ſkill who has ſeen the planks, that they are, in every reſpect, at leaſt equal to the beſt Norway Fir. It muſt give pleaſure to every man who wiſhes well to this iſland, to obſerve, by the great plantations of Larix that are yearly made both in England and Scotland, that the value of this excellent tree is now ſo well underſtood; and if theſe plantations are continued for ſome years with the ſame ſpirit, there can be little doubt, that in half a century hence, the many thouſands at pre-

ſent annually ſent to Norway for timber, will be entirely ſaved to this country.

I am,

SIR,

Your moſt obedient humble ſervant,

GEO. DRUMMOND.

THO. WHITE, Eſq.

PART of the following Paper on the Improvement of Martin Meer was originally received, and intended to have been publiſhed, in the year 1786; ſince which, the ſubſequent part, contained in the Letter dated January 20th, 1789, has been communicated: and the Society having preſented their GOLD MEDAL to Mr. ECCLESTON, "for his ſpirited exertions "on the Improvement of Martin Meer, "by which three thouſand ſix hundred "and thirty-two acres of land have been "gained and protected from the inun-"dation of the ſea;" the Papers in their complete ſtate are now laid before the Public.

The Hiſtory of the Diſorder among the Horned Cattle at Standiſh, near Wigan, was alſo communicated by the ſame Gentleman.

SIR,

SIR,

THE incloſed is the moſt accurate account of Martin Meer, from its primitive ſtate to the condition it is now in, that I can make out; and if you judge the improvements worthy of being laid before the Society for the Encouragement of Arts, Manufactures, and Commerce, I ſhall be obliged to you to produce it whenever you think proper.

I am

Your very humble ſervant,

THOMAS ECCLESTON.

Scariſbrook, Feb. 2, 1786.

Mr. MORE.

MARTIN MEER was formerly a large pool, or lake of freſh water, of an irregular form, ſurrounded chiefly by moſſes or boggy land, containing near one thouſand ſeven hundred and ſeventeen acres, of eight yards to the pole, which is the cuſtomary meaſure of the neighbourhood, (about three thouſand ſix hundred and thirty-two ſtatute acres). It lies in the different Manors of Scariſbrick, Burſcough, North-Meols, Tarleton, and Rufford.

About the year 1692, Mr. Fleetwood, of Bank Hall, propoſed to the ſeveral other proprietors to drain Martin Meer, on condition that a leaſe (for the whole) of three lives and thirty-one years ſhould be granted him; which they agreed to; and Mr. Fleetwood obtained an Act of Parliament the ſame year to empower him to effect it. The following year he began the work: his plan was, to diſcharge the waters immediately into the ſea, at the mouth of the river

river Ribble, which before had forced themſelves a paſſage into the river Douglas, when the Meer waters were raiſed above their uſual height by the land floods, as is noted by Camden in his *Britannia*.

The intermediate ground between Martin Meer and the Douglas, lying conſiderably higher than the Meer, occaſioned the ſtagnation, and kept it continually full.

Mr. Fleetwood began the undertaking, by making a canal, or ſluice, twenty-four feet wide, of a depth ſufficiently lower than the Meer, which he cut from the Ribble mouth through an embanked ſalt marſh, and then through a moſs or bog in North Meols, about a mile and a half in length; and he continued it through the loweſt parts of the Meer. To prevent the ſea from ruſhing up the canal, and overflowing the Meer, which lies ten feet lower than high-water mark, at the ſpring tides, he erected

in his canal, near the ſea, a pair of flood-gates, which ſhut when the ſea waters roſe higher than thoſe in the canal, and opened again by the ſluice ſtream when the ſea retired. In this place, the mouth of the Ribble is nearly five miles over at the ſpring tides; but the bed of the river at low water is no more than a furlong in breadth; and it lies under the Lytham, or oppoſite ſhore to the flood-gates, about the diſtance of four miles from them. This is a very unfavourable circumſtance to the draining of the Meer, as it greatly diminiſhes the effect of the out-fall by the length of the way the waters have to run over a very flat, looſe, flying, ſandy coaſt, before they can diſembogue into the river. Theſe ſands in a few years after the drainage was finiſhed, drifting by the winds into the out-fall ſluice, ſoon obſtructed the flow of the waters, and in a ſhort time choaked up the paſſage, which had been made ſufficiently deep to carry them off.

The

The ſpring tides in boiſterous weather brought up great quantities of mud to the flood-gates; here it lodged in ſediment for want of a powerful current in dry ſeaſons to waſh it away: thus the wiſhed-for effect of ſo much labour was fruſtrated, for the Meer was once more nearly reduced into its primitive ſtate. In order to remove this deſtructive obſtacle of mud and ſand, the managers for Mr. Fleetwood, in the year 1714, thought it moſt adviſeable to raiſe the ſill or threſhold of the flood-gates, which they elevated twenty inches: this, with ſome other meaſures then adopted, did, for ſome time, enable them to keep the flood-gates free from the above-mentioned obſtructions.

But it proved very detrimental; for ſo much fall was loſt, that the arable and meadow grounds upon the Meer diminiſhed greatly in value, by the water remaining upon them all the winter, and very late oftentimes in the ſpring ſeaſon.

By a gradual, continual loſs of out-fall amongſt the ſands, and by the ſluice on the marſh and other parts wrecking up, the Meer lands for many years were only made uſe of as a poor, fenny, watery paſture for the cattle of the neighbourhood, and that for a part of the ſummer months only.

Some time after, Mr. Fleetwood's executors continued their ſluice farther upon the ſhore, and erected a new pair of flood-gates, winged with ſtone walls, conſiderably nearer to the out-fall; and they found great benefit from it, as the gates were much leſs liable to be obſtructed by the ſand and mud brought up with the tide.

About the year 1750 Mr. Fleetwood's leaſe expired; and in 1755 the flood-gates and walls were waſhed down by a very uncommon high tide, but were rebuilt (fourteen feet wide) at the joint expence of the proprietors, in whoſe hands it remained in a neglected ſtate for many years; for, as before,

fore, from inattention to the cleanſing of the ſluice, and from the narrow paſſage at the flood-gates, which were ſtill liable to be choaked with mud, &c. and much of the out-fall being loſt, the lands upon the Meer became again of little value, being covered with water all the winter, and liable to be flooded by very trivial ſummer rains.

In this condition the beſt Meer lands let for a few ſhillings the large acre only.

In the year 1778 I ſettled here; and as the moſt extenſive and valuable ſhare of the Meer belonged to this eſtate, I had the levels taken from low-water mark; and finding a conſiderable fall, I had recourſe to Mr. Gilbert, of Worſeley (who had judiciouſly planned, and happily executed the aſtoniſhing works of his Grace the Duke of Bridgewater). To his friendſhip and abilities I am indebted for the ſucceſs of the drainage; for, after the moſt minute inſpection, he gave me every encouragement, and kindly

aſſiſted

aſſiſted me in directing the undertaking. By his advice I applied to the other four proprietors of Martin Meer, for a leaſe for the term of three lives for their ſeveral ſhares, and opened to them my intention of effectually draining the whole at my own expence. In 1781 I obtained the leaſes from all the proprietors (one only excepted), and immediately began the work.

The plan Mr. Gilbert ſtruck out (which I have executed), was to have in the main ſluice three different pair of flood-gates. The firſt are, to keep the ſea out, which are called the Sea-gates. The ſecond pair are erected at about half a mile diſtance nearer to the Meer, to ſtop the ſea there, in caſe any accident ſhould happen to the firſt: theſe are termed the Stop-gates. The third pair are built cloſe to, and in the ſame walls with the Sea-gates, but open and ſhut in a contrary direction to them: theſe are named the Fluſhing-gates. All theſe three flood-gates are kept open, to give a free

paſſage

paſſage to the waters from the Meer, when the tide has ſufficiently retired; and when the tide riſes again above the level of the waters on the Meer, the ſea-gates are ſhut. In dry ſeaſons, when a ſufficient quantity of water does not come down from the Meer, to keep the out-fall ſluice open acroſs the looſe flying ſands on the ſhore, the tide itſelf is permitted to flow up the ſluice to the ſtop-gates, which are then ſhut; and at high water the fluſhing-gates are cloſed to keep the ſea water in.

N. B. All theſe three ſeveral gates have four paddles at the bottom, three feet in length, and two feet in depth, which are drawn up by ſcrews, to fluſh away any obſtacle that may chance to impede their working.

At low water the paddles of the fluſhing-gates are drawn up, and the retained ſea-water ruſhes out with ſo much violence, that the ſluice to low water is in a very ſhort time

time cleanſed from every obſtruction, ſand, mud, &c. that may have been brought up by the tide.

Thus, by the great ſkill and ſuperior ingenuity of one man (Mr. Gilbert), the great obſtacle to the perfect drainage of Martin Meer is done away, which had baffled the many vain efforts of the proprietors for almoſt a century.

By an accurate examination of the out-fall, Mr. Gilbert found it would admit of the ſill or threſhold of the new gates being laid five inches lower than it formerly had been; and he recommended the ſea-gates to be advanced about two hundred yards nearer to the out-fall upon the open marſh. To prevent the ſea flowing into the ſluice behind theſe gates, large and ſtrong banks are thrown up on each ſide, which are continued to the ſtop-gates; and at the ſame time they anſwer another eſſential purpoſe,

viz.

viz. by containing a larger quantity of ſea-water to fluſh with.

The new ſea-gates are eighteen feet wide, and nineteen feet and a half high, and the ſill five feet lower than the former: this makes the paſſage in rainy ſeaſons, when the water would have run four feet upon the old ſill, to bear the proportion of one hundred and ſixty-two feet in the preſent gates, to fifty-ſix in the old ones.

When we had ſunk to the proper depth of the foundations of the new gates, we found a quickſand, and built upon it. The walls are twelve bricks in thickneſs at the bottom, and there is no ſettlement, nor have they ſunk in the leaſt.—N. B. Large flat ſtones were laid under the brick and ſtone work, and were the only precaution uſed.

Whilſt the gates were building, I employed all the hands I could procure in deepening

ening and widening the ſluice upon a dead level with the ſill up to the Meer, ſix yards wide at the bottom, allowing a foot and a half ſlope to every foot in elevation. In ſome places the cutting was near twenty feet deep; and at the depth of ſixteen feet in ſand, I found an entire trunk of a tree, which ſquared a foot.

In April 1783 the level was carried up completely to the Meer, which then (owing to the waters having been dammed up), was flooded higher than it had been for ſeveral years. As ſoon as the dam-head was cut, the ſuperior efficacy of the new works appeared; and this uncommon flood ran off in five days, which would have required as many weeks to have been diſcharged through the old flood-gates.

After the waters had run off, the ſluice was deepened nearly to the ſame level through the loweſt parts of the Meer.

The

The ſluice is nearly five miles in length from the ſea gates.

The ditches were next attended to; and ſince the drainage, above a hundred miles in length have been perfected: but as ſmall open drains were neceſſary to carry off the rain-water into the ditches, I procured a draining or guttering plough, on Mr. Cuthbert Clark's conſtruction, which was drawn by eight, ſometimes ten able horſes, and which I can with certainty recommend as a moſt uſeful implement in all fenny countries.

I am greatly indebted to the inventor; for, with this, in one day I cut drains nearly eight miles in length, thirteen inches in depth, twenty inches wide at the top, and five at the bottom, more perfect than could have been done in that land by the hand, and which would have coſt, if done by hand, ſeven pounds five ſhillings and ten pence.

The

The ſummer in 1783 was employed wholly as above, in laying the land dry. In the year 1784 ſome few acres were ploughed, and yielded a tolerable crop of ſpring corn; ſome yielded a very inferior kind of hay: the reſt was paſtured. Early the laſt year I prepared for oats and barley, and ploughed nearly two hundred large acres.

The effects of the drainage appear from the crops; for I have ſold barley for eleven pounds ſeventeen ſhillings and ſix pence the large acre, the produce of the land which before let at no more than four ſhillings the acre; and oats at ten pounds ſeventeen ſhillings and ſixpence per acre, off land, which would bring no price before; the purchaſer to cut, carry off, &c. all at his own expence.

From the lands which before afforded a very poor paſture in the drieſt ſummers, I laſt year fed ſeveral head of Scotch cattle,

which

which did better than any that were fattened upon the beſt grazing lands in our neighbourhood. The beſt meadow lands in the moſt favourable ſeaſons did not let for more than about nine ſhillings per acre.

Laſt year I mowed many acres, worth three pounds, and let off ſeveral of inferior graſs, at two pounds per acre, reſerving the after-graſs for my own cattle.

IN conſequence of a Letter written to Mr. ECCLESTON, the following ACCOUNT was received from that Gentleman, with the annexed HISTORY of the DISORDER among the HORNED CATTLE at Standiſh.

SIR,

IN yours of the 31ſt of January, 1788, you deſired me to tranſmit, for the inſpection of the Society, a further account of the improvements that have been carried on upon Martin Meer. This I had before intended, but was prevented giving a particular account from the different loſſes that have annually been ſuſtained ſince the account ſent up in 1786. In the autumn of that year, from the failure of the Douglas-bank, in Ruffard, moſt of the corn crops, which were very luxuriant, were deſtroyed, or greatly damaged: the loſs ſuſtained from it was computed at upwards of ſeven hundred pounds.

The Douglas diſcharges itſelf into the Ribble ſeveral miles nearer to Preſton than the out-fall from Martin Meer. The Douglas waters have no communication with the

the drainage, but running upon a conſiderable higher level, when its banks fail, the waters fall upon the Meer.

In the autumnal equinoxial rains of 1787, the banks of the Leeds and Liverpool canal broke during a heavy flood, and diſcharged all the waters (with thoſe running into it), from a level of twenty-eight miles in length: they carried away or deſtroyed moſt of the cut and unreaped corn, after-math, paſture, turneps, rape, &c. by which flood and other waters a damage equal to the former was ſuſtained.

The damages done by the canal are to be determined and ſettled by arbitration.

The works erected for the drainage have fully anſwered every expectation, and never failed in any one inſtance.

The foregoing accidents have determined me to adopt, in great meaſure, the grazing

inſtead of the tillage line. Low-lying lands are moſtly late ſown, and more liable from that circumſtance to ſuffer from the autumnal floods.

Early in the year 1787, I went through ſeveral of the fen lands in Lincolnſhire; and finding their practice in many reſpects ſuperior, I hired two huſbandmen from thence, and procured ſome fen-ploughs with wheel-coulters, which anſwer infinitely better than our own. The labourers of this neighbourhood are now expert in the management of them, and plough daily, with two horſes a-breaſt without a driver, double the quantity they were uſed to do, and that frequently with three horſes and a driver. Some of the lands are ſo tender, that a board or patten of nine inches or more in diameter is fixed on each foot of every horſe; and from ſuch lands very great crops have been obtained. By cultivation the ſame ſoil will in a few years become ſufficiently firm

to

to carry the horſes without thoſe precautions.

For the firſt crop I adopted the uſual preparation of paring and burning; but finding the ſurface of the neighbouring lands much lowered by a continuance of that practice, I mean in future entirely to relinquiſh it, and in lieu have adopted a practice ſimilar to Mr. Duckett's, of Eſher, mode of trench-ploughing. Mr. Duckett's trench-plough did not anſwer, owing to the toughneſs of the ſward. I beg leave to remark, that this neighbourhood is much indebted to Mr. Duckett, who has allowed one of his ſons to remain in this county to inſtruct us in the management of his implements and his courſe of huſbandry. In ſandy, or light loamy ſoil, it is by far the moſt profitable, as well as the leaſt expenſive ſyſtem a tillage-farm can be conducted on. I mention the above from experience, and have adopted, where admiſſible, his implements and entire practice.

On the Meer lands, a common paring-plough, with two light horſes and a driver, takes up the green ſward from two to three inches in thickneſs, which is followed by the wheel-coulter fen-plough with two horſes a-breaſt. This takes up a furrow from five to ſix inches thick, with which the green-ſward furrow is covered: the ſward which is laid at the bottom of the furrow, by the firſt plough, enables the off-horſe in the laſt to walk in the furrow without ſinking: the freſh ſoil brought up by the laſt plough, will lie a conſiderable time without throwing up any weeds, but from the expoſure to the atmoſphere becomes friable, and fit for the reception of proper ſeeds. What lands a dry autumn will permit to be ploughed as above, will the following ſpring be early ſown with oats, whenever the weather is favourable. The lands ploughed as above in ſpring will be laid down for paſture or meadow, with graſs and rape-ſeeds ſown together.

The laſt year I laid down eight large acres (eight yards to the pole), with graſs-ſeeds and rape, which kept during autumn three hundred large lambs for nine weeks, the lambs moſtly of Mr. Bakewell's breed. Finer graſs cannot be ſeen; which has been highly manured by the eatage the rape afforded.

Flax ſucceeds very well, and with very little trouble; and, as it is earlier pulled than other crops are ſhorn, is certain to eſcape the damage done by the autumnal rains to the neighbouring banks, whoſe failures have proved ſo detrimental to the Meer.

This year and the laſt, during the froſt, many difficulties have been ſurmounted by making good roads for ſome miles in length over the ſofteſt places, many yards deep of quagmire. Faggots were laid, and covered a conſiderable thickneſs with ſand, which in thoſe circumſtances make efficient good

roads, equal to any weight of carriage. The land is too ſoft, without great expence, to ſupport gate-poſts: in lieu of gates, boarded moveable ſledges are laid over the ditches when wanted, and drawn away (by a horſe) to confine the cattle in each paſture.

Of all ſtock, horſes have hitherto paid the beſt on the natural coarſe graſs and weeds on the ſofteſt lands: they come on as well in ſummer as in any of the incloſed higher grounds. On this account my breeding ſtock in that line has been much increaſed, having forty-two mares in foal this year: the next ſpring I ſhall have from fifty to ſixty mares put to the horſe.—The breed is of the coach kind.

It has been remarked, that lambs whilſt on the ewe grow and improve more on the Meer than on the beſt old incloſed lands in the neighbourhood; but the ewes are far inferior in condition to thoſe kept on the other lands: the old ſheep have been very

ſubject

ſubject to the rot on the Meer, indeed, throughout this neighbourhood.

Could the rot be prevented, the drained lands would conſtantly keep, beſides the preſent ſtock, one thouſand five hundred ewes, and bring up their lambs in ſummer.

Could any reward be too great for a preventative or cure of that fatal diſorder, of which ſo many thouſands die annually in this kingdom? Black cattle have not ſucceeded ſo well in the rearing line as might have been expected, and that entirely owing to the ignorance of cow-doctors in their diſorders.

The laſt year I reared upwards of ſeventy calves, and ſhould annually have attempted to rear one hundred, were it not for the diſorder called here the *Hyon*. The cattle are chiefly of the long-horned kind, which I find hardier than the Galloway Poles, or the ſhort-horned breed. In proportion to the

the juſtneſs of their make, they ſtand the cold and coarſe food the better.

I am,

SIR,

Your much obliged

And obedient humble ſervant,

THOMAS ECCLESTON.

Scariſbrook, 20th Jan. 1789.

Mr. MORE.

P. S. I take the liberty of troubling you with a few remarks on the neceſſity of, or the advantage that would accrue to the public from, a Veterinarian School. In other countries they have already found the benefit of that uſeful inſtitution. I am informed, at Copenhagen, a Royal Veterinarian School is eſtabliſhed; and our wiſe

wiſe political neighbours have two, viz. one at Paris, the other at Lyons. From ſeveral of my acquaintance in France, I am informed that horſe-ſurgery and every other branch of farriery is much improved ſince their eſtabliſhment. A few facts, that have come to my knowledge, I beg leave to mention; and have incloſed for your peruſal, an account of the late diſorder among the cattle at Standiſh Hall, which was ſent to me, as I act for Mr. Standiſh during his ſtay abroad.

Mr. Moorcroft, who attended, and drew up the account, is a young man of the greateſt abilities, and has agreed to turn his thoughts from the practice of phyſic and ſurgery, entirely to that of farriery in every branch, provided he can meet with ſufficient and certain encouragement in the eſtabliſhment of a Veterinarian School. If you can point out any method likely to raiſe a ſubſcription for ſuch a purpoſe, you will

will confer a ſingular favour on all the farming line.

Mr. Dicconſon, of Aſton Frodſham, Cheſhire, a few years ago loſt in a ſhort time eighty head of cattle; neither the cauſe, nor a cure of the diſorder, has as yet been diſcovered.. I have not heard of any appearance ſince his cattle died.

In the year 1780, I loſt eleven out of thirten rearing calves by the diſorder here called the *Hyon*. I have conſulted the faculty, and all the farriers hereabouts, who as yet have not been able to determine, whether it be of the inflammatory or putrid kind: one half of the rearing ſtock in this neighbourhood, in my opinion, fall victims to it. In the year 1781, I loſt by the ſame diſorder thirteen out of fifteen rearing calves; at preſent have only twenty-eight calves living out of upwards of ſeventy that were reared the laſt year. From Tueſday the 6th to Monday the 11th of this

this month, I loſt by the *Hyon* twenty-four head, although every aſſiſtance was procured this neighbourhood afforded. Moſt of the others that I have loſt, have died of the above diſorder, but cannot exactly aſcertain the number.

The diſorder ſeems chiefly confined to the two counties, Lancaſhire and Cheſhire. It is not to be found in any book of farriery: it reſembles what is termed in Lincolnſhire, amongſt the ſheep, the *Reſp*: it is mortal, and generally ſeizes the beſt-conditioned of the ſtock, but ſeldom or never after they have been put to the bull.

HISTORY *of the* DISORDER *among the* HORNED CATTLE, *at* Standiſh, *near* Wigan.

ON the 20th of October, 1788, a heifer in calf was found dead in the field: ſhe had been ſeen the day before, and no marks of diſeaſe were at that time obſervable.

In the courſe of the day, two more cows were attacked with difficulty of breathing, conſiderable enlargement of the noſtrils and throat, preceded by, and accompanied with great proſtration of ſtrength, heavy languid countenance, loſs of appetite, and a diſcharge of mucus from the noſtrils, which at firſt was fluid and colourleſs, but toward the cloſe of the diſorder became yellowiſh, and of thicker conſiſtence, though not fetid: an increaſed degree of theſe ſymptoms terminated in death, uſually in leſs than

than forty-eight hours. At the firſt appearance of the complaint, all the cattle were bled, and had their noſes ſmeared with tar: large rowels, compoſed of the leaves of bearsfoot, cloves of garlick, and other ſtimulating ſubſtances, were inſerted in the dewlap.—No accurate account of the appearances, on opening them, could be procured.

Not having derived any advantage from the aſſiſtance of men the moſt experienced in the diſeaſes of cattle, it was thought proper to ſtate the caſe to Dr. Brandreth, and Dr. Lyon, of Liverpool: theſe Gentlemen, from the mode of attack, rapid progreſs, and ſpeedy termination of the complaint in death, were induced to conſider it as a diſeaſe of the putrid kind.

In conformity to this opinion, ſuch a mode of treatment was recommended to be adopted, as appeared to them moſt likely to ſupport vital energy, and reſiſt putrefaction.

With

With theſe views, large quantities of Peruvian bark, in Port wine, or ale, were adviſed to be given; the inteſtinal canal to be kept gently open, but the uſe of purgatives was interdicted: bliſters, and cloths wetted with a ſtrong ſolution of camphor in ſpirit of wine, were ordered to be applied to the inflamed parts, and to be retained by means of linen moiſtened with the ſtrongeſt vinegar. Cold water was directed to be daſhed upon the diſeaſed cattle twice in the day.

In order that the methods recommended might be properly inforced, I was commiſſioned to go to Standiſh, along with Mr. Wilſon, an experienced Farrier. One cow was apparently in a dying ſtate, when we came: the head and neck were much ſwollen, and reſpiration was performed with the utmoſt difficulty.—As it was evident that ſhe could not live long in that ſituation, I made a tranſverſe inciſion betwixt the rings of the wind-pipe: ſhe appeared im-

mediately to be much relieved, breathed more freely, made an effort to riſe, and lived nearly two hours after.

In every one that was affected, great debility, laborious reſpiration, diſcharge of mucus from the noſtrils, and enlargement of the head and neck, obtained in greater or leſs degree. The belly was in general open; they ſwallowed without difficulty, ſtaled freely, and no preternatural appearance was diſcoverable in the dung or urine. A few hours before death, the ſkin became hotter than is uſual: this was ſucceeded by cold clammy ſweats, and ſwelling of the belly. Their breath had a peculiar ſmell, but was not fetid. The pulſe varied conſiderably: in one of two cows, which were ſeized nearly at the ſame time, it beat ſeventy-two; in the other, one hundred and twenty times in the minute; a few minutes only elapſing betwixt the examination of each.

With the approbation of Dr. Stapleton, of Preſton, who was preſent, I made inciſions into the inlarged parts, with a view to unload the cellular membrane.

By the advice of this Gentleman, one cow, a little indiſpoſed, was bled, and that in a full ſtream, in order to aſcertain the putrid or inflammatory ſtate of the blood: it had no appearance of ſize, but on the next day became offenſive, and the craſſamentum was of a particularly looſe texture. This cow died the following day; it did not appear either to ſuffer, or benefit, by the loſs of blood. Dr. Stapleton recommended the perſeverance in the means ordered by Drs. Brandreth and Lyon. The daſhing with cold water appeared to refreſh, and render them ſomewhat more cheerful.—An ounce of bark was adminiſtered every two or three hours.—Every mode of treatment which had been recommended, did not appear to have much influence in the prolongation of life: it muſt, however, be

be acknowledged, that in all the inſtances in which theſe means were uſed, the diſeaſe was in an advanced ſtate.

Immediately after my arrival, a cow which had been affected with the above ſymptoms for a few hours only, and was in a leſs advanced ſtate, was killed, in order to examine the morbid appearances in ſuch ſtate.—The fauces, gullet, wind-pipe, and lungs, appeared healthy; the firſt ſtomach was ſomewhat inflamed; the ſecond and third had no ſigns of diſeaſe; but the inner coat of the fourth exhibited a conſiderable degree of inflammation.—The enlargement of the head and neck was owing to a collection of yellow tranſparent fluid in the cellular membrane, which coagulated on expoſure to a gentle heat.—The morbid appearances in the other cows that were opened (and that immediately after death) were in general uniform.—The lungs were in ſome part eroded, in others mortification had actually taken place; and on opening

the cheſt, a quantity of putrid air ruſhed out. The membrane lining the noſtrils and wind-pipe was in almoſt every inſtance much inflamed.

The heart, in moſt caſes, had partaken of the inflammation; the reſt of the viſcera were generally uninjured.—In one cow, which had been affected with vertigo (clearly expreſſed by her motions), a ſmall quantity of purulent matter was effuſed upon the dura mater: no other morbid alteration appeared in the brain, nor was any diſcoverable in that of the reſt. It was particularly inſiſted upon by Drs. Brandreth and Lyon, that all communication betwixt the diſeaſed and healthy cattle ſhould be avoided: perſons who had been much among the infected animals, were expreſſly forbidden to approach thoſe which were well. The greateſt praiſe is due to Mr. Ainſley, agent for Mr. Standiſh, for his unremitted attention to this circumſtance, and for his very vigorous proſecution of every method which had

had been thought expedient.—Malt was recommended as a cordial and antiſeptic food.—On the 28th advice was ſent to the above-mentioned Gentlemen, that every attempt had proved inefficacious.—On the 29th Mr. Puiſglove, of Sheffield, (a Gentleman who had long paid attention to the diſeaſes of cattle) came over to Standiſh; he agreed with the Medical Gentlemen reſpecting the putrid nature of the diſorder.

On examining the remaining ſtock, the languid movement, dejected countenance, and a ſmall diſcharge of mucus from the noſtrils of three cows, gave reaſon to ſuppoſe they were infected.—Two drachms of emetic tartar, a ſcruple of calomel, and ten grains of powdered opium, were immediately given to each.—In the ſpace of two hours, they appeared to be much deranged, trembled exceſſively, and perſpired copiouſly: theſe appearances were ſoon followed by violent purging. Twelve hours

after, an ounce of bark, with two drachms of camphor, and the ſame quantity of laudanum, were adminiſtered in a quart of ſtrong ale.—Quick-lime was thrown into the pond from which they drank.—The next morning they appeared more ſprightly, but marks of diſeaſe were ſtill obſervable, particularly in one.—This medicine (the bark and camphor) was repeated every twelve hours.

On the morning of the 30th an expreſs arrived from the Gentlemen at Liverpool, intimating that it was their wiſh that the former methods ſhould be perſiſted in; not having been appriſed of the favourable change which had taken place under Mr. Puiſglove.

The vapour of boiling vinegar, or highly rectified ſpirit of wine, in which camphor had been freely diſſolved, was directed to be placed under the noſtrils of the cattle. Bark, wine, ale, and ſtrong wort, with

the addition of the vitriolic acid, were ordered to be given in large quantities.

Bleeding was particularly forbidden.—Happily, however, no further medical aſſiſtance was required.—Provided the contagion continued to ſpread, it was their opinion that it would be adviſeable to deſtroy every infected animal out of Standiſh-Hall farm, on the earlieſt appearance of the diſorder.—No doubt can be entertained reſpecting the contagious quality of the diſeaſe.—Two cows of Mr. Hatton, a neighbouring Gentleman, unfortunately in the night broke in among the Standiſh-Hall cattle, ſoon after the firſt appearance of the complaint; and both died of the diſorder.—No noxious vegetable could be found among the herbage, after the moſt careful examination.

The firſt cows that were ſeized were in an old ley; the cattle of the Standiſh-Hall farm had always been remarkably healthy

previous to this attack.—All the cattle which died, were, as ſoon as poſſible, buried at leaſt four yards deep.—Twenty-one were attacked, and only three have recovered.—The diſorder, from the beſt intelligence, appears to be intirely ſtopped.

W. Moorcroft, Pupil to Dr. Lyon.

Nov. 12, 1788.

THE

THE Thanks of the Society were preſented to Sir JOSEPH BANKS, Bart. Preſident of the Royal Society, for his attention to the views of this Inſtitution, by the following communication reſpecting the diſorder called the Scab in Sheep.

The Society during the courſe of ſeveral years offered Premiums for the diſcovery of an effectual remedy for this diſeaſe, but without effect, though ſome claims were made for the reward offered; yet, as the following method has been found fully adequate to the purpoſe intended, it is hoped due attention will be paid to it in the different parts of the kingdom; and any accounts of the ſucceſs attending its uſe, will be well received by the Society.

SIR,

SIR,

HAVING obſerved, in the laſt volume publiſhed by the Society for the Encouragement of Arts, Manufactures, and Commerce, that an effectual method of curing the Scab in Sheep was ſtill wanting to the Farmers (in the South of England at leaſt), when it was publiſhed; I take the liberty of tranſmitting the encloſed receipt to you.

Take one pound of quickſilver,
half a pound of Venice turpentine,
half a pint of oil of turpentine,
four pounds of hogs lard.

Let them be rubbed in a mortar till the quickſilver is thoroughly incorporated with the other ingredients; for the proper mode of doing which, it may be neceſſary to take the advice, or even the aſſiſtance, of ſome apothecary, or other perſon, uſed to make ſuch mixtures.

* The

* The method of uſing the ointment is thus: Beginning at the head of the ſheep, and proceeding from between the ears along the back to the end of the tail, the wool is to be divided in a furrow till the ſkin can be touched; and as the furrow is made, the finger ſlightly dipped in the ointment is to be drawn along the bottom of it, where it will leave a blue ſtain on the ſkin and adjoining wool: from this furrow, ſimilar ones muſt be drawn down the ſhoulders and thighs to the legs, as far as they are woolly; and if the animal is much infected, two more ſhould be drawn along each ſide, parallel to that on the back, and one down each ſide between the fore and hind legs.

* Though there does not appear to be any difference between this ointment and the Unguentum Cæruleum of the ſhops, I have choſen to give the receipt exactly as it was given to me. Some of our Graziers begin to uſe it by rubbing it into the naked part of the thigh and fore leg; a practice much leſs troubleſome, but which requires much more judgement than the above.

Immediately

Immediately after being dreſſed, it is uſual to turn the ſheep among other ſtock, without any fear of the infection being communicated; and there is ſcarce an inſtance of a ſheep ſuffering any injury from the application. In a few days the blotches dry up, the itching ceaſes, and the animal is completely cured: it is generally, however, thought proper not to delay the operation beyond Michaelmas.

The Hippoboſca Ovina, called in Lincolnſhire, Sheep Fagg, an animal well known to all ſhepherds, which lives among the wool, and is hurtful to the thriving of ſheep, both by the pain its bite occaſions, and the blood it ſucks; is radically deſtroyed by this application; and the wool is not at all injured. Our wool-buyers purchaſe the fleeces on which the ſtain of the ointment is viſible, rather in preference to others, from an opinion that the uſe of it having preſerved the animal from being vexed either with the Scab or Faggs, the wool

is

is leſs liable to the defect of joints or knots; a fault obſerved to proceed from every ſudden ſtop in the thriving of the animal, either from want of food, or from diſeaſe.

This mode of curing was brought into that part of Lincolnſhire where my property is ſituated, about twelve years ago, by Mr. Stephenſon, of Mareham, and is now ſo generally received, that the Scab, which uſed to be the terror of the farmers, and which frequently deterred the more careful of them from taking the advantage of paſturing their ſheep in the fertile and extenſive commons with which that diſtrict abounds, is no longer regarded with any apprehenſion: by far the moſt of them have their flock anointed in autumn, when they return from the common, whether they ſhew any ſymptoms of ſcab, or not; and having done ſo, conclude them ſafe for ſome time, from either giving or receiving infection. There are people

people who employ themſelves in the buſineſs, and contract to anoint our large ſheep at five ſhillings a ſcore, inſuring for that price the ſucceſs of the operation; that is, agreeing, in caſe many of the ſheep break out afreſh, to repeat the operation *gratis*, even ſome months afterwards.

I beg to have it underſtood, that in communicating this information to the Society, I do not offer myſelf as a Candidate for the Medal propoſed by them as a reward: having been neither the diſcoverer nor the introducer of the remedy, I can lay no claim to it. Reſpect to the patriotic views which have ever guided their conduct, and the hope of being uſeful to the Breeders of Sheep, are the motives which have induced me to lay this paper before them; and an additional one I confeſs it to be, that it gives me an opportunity of publicly teſtifying the reſpect with which, in conſequence of your active induſtry, in bringing forward uſeful inventions,

tions, and checking the pretenſions of deſigning impoſtors, I can with ſincerity profeſs myſelf

Your real well-wiſher,

And faithful ſervant,

JOSEPH BANKS.

Soho Square, April 17, 1788.

THE

THE Thanks of the Society were given to Mr. WAGSTAFF for the following Letter on the Uſe of the *River Conferva* as a Manure.

GENTLEMEN,

AMIDST the various encouragements for the improvement of your country, you have been attentive to the comparative value of manures; but I have not in preſent recollection any immediate encouragement for the diſcovery of any new ſubſtance, whoſe unknown virtue might be called forth by experiment.

I beg leave therefore to lay before you a courſe of experienced benefit which has reſulted from repeated trials made on the *River Conferva*, extracted with its roots, and ſo much of its muddy bed as adheres to their deep and interwoven fibres. Theſe, drawn

drawn from a mill-ſtream about Midſummer 1787, were laid to ferment, which followed in a few weeks; and, when the heaps were broken, emitted effluvia which ſufficiently indicated their fermentation.

The firſt experiment was on part of a field preparing for turneps, in an equal proportion as to quantity, with a blended manure from ſtye and ſtable, and ſpread at the ſame time. The boundary of the Conferva manure was exactly determined, and the ſize of the roots and healthy expanſion of the leaves of the turneps in no degree inferior to the general appearance and produce of the field. A load of this, more mixed and digeſted, and ſomewhat incorporated with a broken ſod of the river's ſide where it was laden, I laid on an entire gravel, and thereon planted cabbage of different ſpecies, and at the ſame time planted ſome of either ſort on a garden ſoil, and on a mud, in ſeparation from all aquatic weeds and every other ſubſtance.

The progreſs on the firſt was great, and obviouſly ſuperior to thoſe on the garden mould; while thoſe on the unblended mud were unhealthy and diminutive. In ſucceſſion to the cabbage experiment, on part of the ſame ſpace, in the enſuing ſpring, I planted, about eighteen inches aſunder, ten potatoes, about the ſize of turkey eggs; and, at an equal diſtance, parings of about fourteen more (from ſomewhat larger roots), in nine diviſions or ſets: the produce of which were, when taken up October the ſeventh, 1788, twenty-nine pounds four ounces from the ten whole potatoes, and twenty-nine pounds twelve ounces from the nine diviſions of parings; and, what may appear ſingular, two of the largeſt potatoes, which weighed together thirty-one ounces, aroſe from the parings; the two largeſt from the whole potatoes, were twenty-five ounces.

As, perhaps, the mode of raiſing potatoes from parings may not be generally apprehended,

hended, I ſhall juſt take the liberty of remarking on that head, that what theſe were propagated from were not cloſe pared, but in the manner which turneps generally are for the table, whereby two thirds or more of the farinaceous ſubſtance of the potatoes were boiled, and anſwered the intention of this eſculent root.

In ſucceſſion to the turneps before mentioned, followed barley, a large and better crop than ever grew on that field before; and the diviſions where the aquatic compoſt was ſpread, were diſtinguiſhably productive. A contra-diſtinction was ſtill more obvious in a low field dibbled with wheat—a hilly gravel ariſing in one part of it was ſpread with this manure, and the nether and deeper ſoil around it left to its inherent quality; the former, though with only a thin ſurface of earth upon it, carried the appearance of double the crop to the better natural ſoil not ſpread with the aquatic compoſt.

I wiſh to add, that all river-weeds, mown in their moſt herbaceous ſtate, and carried to the up-land arable, will remarkably promote the forward vegetation of turneps, and their conſequent increaſe in root: but that operation leaves the more efficacious fibres and roots of the river-weeds unremoved. Nor, indeed, is the Conferva by its adheſion to the beds of rivers eaſily ſevered by the ſcythe, but by the method referred to, of drawing out the Conferva particularly, and in general the whole tribe of aquatic plants, root and herbage, with ſo much of the river ſoil as adheres to their fibres: and being expoſed a time to the fervor of the longeſt days, their warmth, with the reſident principles of fermentation in their blended maſs, will prepare it for the uſeful purpoſes of agriculture; and when ſpread, as the common manure is ſpread, over arable land, an increaſe of its production will follow, perhaps ſignally ſuperior to what ariſeth from thoſe dreſſings the ſoil has been accuſtomed to.

I may

I may take the liberty of adding, that the Confervas, or ſomewhat of a ſimilar manure, are eaſily procurable through the general part of the nation; for where rivers are not in vicinity, there are but few diſtricts where the current of the fountain, or the increaſing rivulet do not wind their way. The borders of theſe ſhallow runs are not unfrequently encumbered with lofty paluſtrian plants, whoſe removal is an immediate advantage to the adjoining paſturage, and a conſequent ſuperior benefit to every arable field where applied. I am, with an eſteem of your diſtinct partriotiſm,

Your reſpectful friend,

JOHN WAGSTAFFE.

Norwich, Dec. 31, 1788.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

PAPER

IN

POLITE ARTS.

POLITE ARTS.

IN the fourth Volume of these Transactions, page 144, a Description is given, with a Plate annexed, of a Machine invented by Mr. Grenville for teaching Blind Persons the Rules of Arithmetic; and in the fifth Volume, page 125, is given a Description, with a Plate of Mr. Cheese's Machine for teaching Blind Persons Music. This year a portable Machine, called a Pocket Memorandum Book, for the Use of Persons deprived of Sight, was produced to the Society by Mr. ROBERT BROMLEY, the Inventor; to whom the SILVER-MEDAL was voted: and one of the Machines is reserved in the Society's Repository for the use of the Public.

DESCRIPTION

DESCRIPTION *of the* POCKET MEMORANDUM BOOK, *invented by Mr.* BROMLEY, *for the Uſe of Perſons deprived of their Eye-Sight.*

THIS machine repreſents a box nine inches long and ſix inches wide, and, when ſhut, one inch and a half deep.

When it is opened, (which is done by putting the end of a watch-key into a ſmall hole, at the end near the opening, and puſhing back the ſpring),

The right diviſion is appropriated to the regular arrangement of the alphabet; and on the nine lines within it are various pins, having heads of different forms, by which the Blind Perſon is enabled to diſtinguiſh them; and thus they ſerve as letters or figures, as may be required, each line containing three letters. The firſt part of the upper line contains ſeveral pins repreſenting the letter A; the ſecond, ſeveral repreſenting

B;

B; the third, ſeveral repreſenting C:—the firſt part of the ſecond line, ſeveral repreſenting D; the ſecond, ſeveral repreſenting E; the third, ſeveral repreſenting F—and ſo on; allowing to each line three letters to the end of the alphabet, which finiſhes in the middle diviſion of the ninth or bottom line; the third part of which line is filled up with dots or points, which I make uſe of for various purpoſes; for inſtance, an apoſtrophe in writing, and a cypher in arithmetic. And to reduce the book to a proper ſize for the pocket, inſtead of forming different characters for figures (which would have required a greater number of lines), I make uſe of the letters which form the word TUNBRIDGE: beſides theſe, I have arranged on a looſe line a ſingle alphabet, with letters written under each character, which explains them very clearly.

The eight lines in the left diviſion of the Book, ſerve for fixing the pins upon in writing, working ſums in arithmetic, &c.

But

But when it is uſed for the latter, as it is neceſſary to form columns for the different rules, they are eaſily done by the wires, which are bent at each end; for which purpoſe obſerve the ſmall holes in the upper and lower edge of this diviſion, which are exactly oppoſite each other: theſe are intended to receive the feet of the wires, and, if put ſtraight in, will form right lines acroſs the others, placing them at a greater or leſs diſtance as the different rules require; and theſe will guide in the regular diſtribution of the figures.

ROBERT BROMLEY.

PAPERS

PAPERS

IN

MANUFACTURES.

MANUFACTURES.

IN the ſixth Volume of theſe Tranſactions, page 159, ſome account is given of the reaſons which firſt induced the Society of offer a Premium for the manufacturing, in theſe kingdoms, Paper from Raw Vegetables. It there appears that in the year 1787 the Society voted their SILVER MEDAL to Mr. GREAVES, of Mill-Bank, near Warrington, for his attempt to forward the views of the Society, by making ſo uſeful an article as Paper from refuſe Materials, not hitherto applied to that purpoſe in this country: and in the year 1788, the ſame Candidate having ſent in the quantity of Paper required, with the following Certificates and Letters, TEN GUINEAS, being the Premium offered for making Paper from Raw Vegetables, was adjudged to him.

SIR,

SIR,

ON the 20th, 21ſt, and 22d of Auguſt laſt, we made fifteen reams of paper from the bark of Withen twigs in its green ſtate, as it was ſtripped from the twig, with a few green nettles. I have this day forwarded to you by Jonathan Higginſon's waggon from Warrington one of the reams, which I hope you will receive ſafe, and find a good deal improved; and although it has not been attended, in making the whole fifteen reams, with near ſo much trouble or expence as the two reams were laſt year, I conſider it to be of very ſuperior quality: but I apprehend that to leave out the nettles will be better, as in them there is a bony ſubſtance that does not ſo well incorporate with the other vegetables.

If you find the paper ſent likely to be uſeful, and it be approved, I can ſend you

more of it, and next year ſhall be enabled to make a much larger quantity.

I ſhall be glad to hear from you, and to give you any further information that may tend to promote the public good, which may be in the power of,

SIR,

Your moſt humble

and obedient ſervant,

THOMAS GREAVES.

N. B. Upon the firſt wrapper, next to the ream, you will find a ſample of the vegetable the paper was made from, though when in its green ſtate it was of a much tougher ſubſtance than now when dried.

Mill-Bank, near Warrington,
23d Oct. 1788.

Mr. MORE.

THIS is to certify, That the ream of paper ſent in by Thomas Greaves, in claim of the Premium offered by the Society for the Encouragement of Arts, &c. was made of Withen bark, of the ſame kind with the ſample ſent; and that there was made at the ſame time fifteen reams of equal quality, as ſpecified in the paper ſent herewith, wherein the beſt account in our power is given of the price at which it can be ſold.

Witneſs my hand,

THOMAS GREAVES.

Signed alſo by me, Thomas Greaves, ſon of the above Thomas Greaves, who was employed by his father in making the ſaid paper, and is fully informed of the truth of all that is related in the above Certificate and paper now ſent.

THOMAS GREAVES, jun.

SIR,

SIR,

I RECEIVED your Letter, and in anſwer to it beg leave to inform you, the quantity of paper made from raw vegetables was fifteen reams. Paper of the ſize and thickneſs of that ſent, when made from ropes, we ſell at eight ſhillings and ſixpence per ream: the coſt of ropes at our mill is eight pounds ten ſhillings per ton, long weight, that is, one hundred and twenty pounds to the hundred weight: the weight of ropes required for one ream of that paper will be about forty pounds, the value about three ſhillings. The value of the Withen bark at our mills is about ten ſhillings per ton: thus, forty pounds of the Withen bark, the quantity required for making one ream of the paper, will, at the rate of ten ſhillings per ton, coſt two-pence. The difference, therefore, of the value of the materials on one ream of paper, is two ſhillings and ten pence; and from the reduced price of the

materials, the paper may be ſold at five ſhillings and eight pence per ream.

The paſteboard made of ropes for book-backs is ſold at two-pence halfpenny per pound, which is twenty-five pounds per ton, long weight: the coſt of the ropes is eight pounds ten ſhillings. The ſame thickneſs of paper made from Withen bark, at the value of ten ſhillings per ton, may be ſold at ſeventeen pounds per ton; which makes a difference of eight pounds per ton.

I am, SIR,

Your humble ſervant,

THOMAS GREAVES.

Mill-Bank, near Warrington,
1ſt Nov. 1788.

Mr. MORE.

TO eſtabliſh the Manufacture of Marbled Paper in England, was an early object of the wiſhes of this Society, and has been attended with very happy effects. This year the following Letter, and ſeveral ſamples of Marbled Paper, ſuperior in elegance of pattern and variety of colours to thoſe commonly made, having been produced by Mr. DAVIS, of Saliſbury-court, Fleet-ſtreet, the SILVER MEDAL was voted to him by the Society, as a mark of their approbation of his attention to the improvement of that manufacture.

Several ſamples of this Paper are reſerved in the Society's Repoſitory.

To the Right Honourable the Preſident, Vice Preſidents, and Members of the Society for the Encouragement of Arts, Manufactures, and Commerce.

MY LORDS and GENTLEMEN,

THE manufacture of Marbled Paper having ſome years ſince been thought worthy the countenance and ſupport of your moſt uſeful and public-ſpirited Society, I hope I may be permitted to addreſs you thereon, and lay ſome ſpecimens of Marbled Paper of my own invention and manufacture before your very valuable Inſtitution: the utmoſt of my wiſhes is to merit your countenance and ſupport; and the preſent application, if ſo fortunate as to be conſidered worthy your attention, is only to ſolicit the ſanction of the Society, which I ſhould eſteem as the higheſt honour I can obtain, and would prove the greateſt encouragement to my aſſiduity in the improvement of this manufacture,

manufacture, and conſiderably increaſe my endeavours to bring the ſame to the greateſt degree of perfection.

The principal conſumption of this paper is by the Book-binders; and the common Marbled Paper, from the coarſeneſs of its figure and glare of colours, is as little uſed as poſſible. The preſent ſpecimens (many of which are imitations of foreign marbles), from the delicacy of the figures, and beauty of the patterns and colours, will, as the inventor flatters himſelf, if approved of by the Society, extend its manufacture, and prevent the importation of Marbled Paper from abroad.

I am,

My Lords and Gentlemen,

Your moſt obedient humble ſervant,

John Davis.

Saliſbury-court, Fleet-ſtreet.

IN the former volumes of these Transactions, several Papers have been printed on the practicability of rearing Silk-worms in England: and the Society having been favoured by the Rev. Mr. GEORGE SWAINE, with the following Letter, dated May 26, 1788, and a complete Apparatus as described therein for rearing those valuable Insects, the SILVER MEDAL was voted to that Gentleman for his several communications relative to the treating of Silk-worms, and thereby shewing his readiness to promote the views of this Institution.

And as a still further proof of Mr. Swaine's attention, the Society were afterwards favoured with his Letter of the 26th of December, 1788, containing further Observations on this subject, which are hereto added, with a Plate of the Apparatus described in his Letter.

SIR,

SIR,

I DEFERRED to thank you for the favour of your Letter, and the Society for their very acceptable preſent of the fifth volume of their Tranſactions, till I could conveniently tranſmit the apparatus, which I mentioned in my laſt, I had the idea of conſtructing, for the more convenient feeding of Silk-worms. The delay has been much longer than I expected, owing to ſome peculiar engagements, and which, therefore, I hope the Society and yourſelf will be ſo kind as to pardon.

An apparatus of the kind above mentioned you at length find in the package with this, which I beg leave to tender for the Society's acceptance, together with my beſt thanks for their preſent, as well as for the favourable attention which my former communication obtained.

The

The frame is of the full ſize I would recommend, as I mean it to be eaſily portable. The Worms are to be kept on the drawers with paper bottoms, till they are grown ſo large as not readily to creep through the gauze-bottomed drawers: they are then to be placed on thoſe drawers, where they are to remain till their excrements are ſo large as not readily to fall through: when this is the caſe, they muſt be removed to the drawers with wicker bottoms, and fed thereon till they ſhow the ſymptoms of being about to ſpin.—It is ſcarcely neceſſary to mention, that the paper-ſlides beneath the gauze and wicker drawers, are intended to receive the dung, which ſhould be emptied as often as the Worms are fed, at leaſt once a day; or to direct that when the Worms are fed, the ſlides are to be firſt drawn out a conſiderable way, and the drawers to reſt upon them.

It has been, I believe, the uſual method in this country, to make receptacles for the worms

worms when they ſhow ſymptoms of ſpinning, by pinning together papers in the ſhape of inverted cones, with broad baſes. This method, where there are many worms, is exceedingly tedious, waſtes much paper, and uſes a large number of pins: beſides, as the Silk-worm always weaves an outer covering or defenſive web, before it begins the cocoon or oval ball, I apprehended that it cauſed a needleſs waſte of ſilk in forming the broad web at the top. The method I make uſe of is, to roll a ſmall piece of paper (an uncut octavo leaf, ſuch as that of an old magazine is ſufficient for three), round my fore-finger and to give it a twiſt at the bottom; which is done with the utmoſt expedition, and gives no occaſion for the uſe of pins. Theſe rolled paper-caſes being likewiſe of a form more nearly reſembling that of a cocoon, with a much narrower opening on the top than the others, takes away the neceſſity of waſting much ſilk in the outer web, and conſequently leaves more to be employed in forming the ball.

ball. The ſilk is readily taken out of theſe caſes by untwiſting the bottom; and if this be done with moderate care, and the papers are preſerved, they will ſerve ſeveral times for the like purpoſe.

It is poſſible theſe minute and ſeemingly trifling directions may be looked upon by many as utterly unworthy of attention: my opinion is different;—even in eſtabliſhed manufactories, and much more in introducing a new one, whatever tends, though in a ſmall degree, to expedite the buſineſs and to diminiſh the expence, is not, I conceive, to be eſteemed of inconſiderable importance.

It was part of my idea, to place this apparatus in the open air by day, and to hang it up by night in an out-houſe to prevent all litter and inconvenience of keeping the worms in the dwelling-houſe. With this intention it was made with a roof and an iron loop at top, which would be entirely

uſeleſs

uſeleſs if the frame was always to be kept within doors. The frame which I firſt made was, moreover, ſurrounded with canvas, with a door to open in front; which in the above intention would have been neceſſary to ſcreen the worms from the ſun and winds by day, as well as to protect them from the depredation of birds and other devourers both by day and night. This ſcheme was tried; but the weather proving very windy and unfavourable when the frame was firſt carried out, it was removed within doors through a fear of injury to the worms, and was neglected to be carried out afterwards.—I mean, however, to renew the attempt another ſeaſon. Each wicker drawer, I apprehend, will afford ſufficient room for five hundred worms when grown to their full ſize. I have kept on ſeveral drawers of this ſize ſix or ſeven hundred; but they ſeemed to be rather too much crowded, although they are naturally gregarious and fond of cluſtering together. By attempting to keep a larger ſtock laſt

ſeaſon

ſeaſon than I could get ſufficient food for, I loſt great numbers, and greatly injured the remainder: there being only one mulberry-tree in this place from which I could procure leaves, my little family was often, through neceſſity, ſtinted in their food; and I have found, when that has been the caſe in any conſiderable degree, the Worms will never thrive afterwards. The above diſaſter will make me cautious how I attempt to breed many Worms in future, till I can be certain of obtaining a ſufficient maintenance for them; yet I am not without a proſpect that this obſtacle to my wiſhes will not long remain, having procured from Mr. Malcolm's nurſery the laſt ſpring eight white mulberry trees, two of them eighteen or twenty feet in height, and moſt of the others eight or ten feet. I have likewiſe procured ſeveral ſmall ſtools of the black mulberry; and I mean to give all the attention to the raiſing and propagating of both kinds which is conſiſtent with a proper regard to purſuits of greater moment.

When

When I received the mulberry trees from London, I had reaſon to fear, from the length of time they had been out of the ground (which could not have been leſs than a fortnight), and from the dry appearance of their roots, that I ſhould not have had one of them grow; but by proper care in planting, and frequently watering them in the ſummer, I have loſt only one.

Being poſſeſſed of this treaſure, I was deſirous of making an experiment to aſcertain which ſpecies of mulberry was moſt agreeable to the ſilk-worm, and moſt productive of ſilk. With this view, June 12, 1787, I took off a few Worms from the paper of eggs, where they were then juſt hatched upon a leaf of each ſpecies of the mulberry, and nearly a like number on a lettuce leaf. Theſe leaves, with the Worms on them, were laid ſeparately on three ſmall paper pans, which pans were placed on one of the paper-bottomed drawers in the frames, and each paper marked.

No.

No. 1 contained the white mulberry leaf;
No. 2, the black;
No. 3, the lettuce.

The Worms in the pans marked No. 1 and 2, were ever after conſtantly fed with the ſame kind of food which they had firſt taſted; thoſe of No. 3 were fed with lettuce leaves till they had caſt their firſt ſkins, and afterwards with black mulberry leaves: the worms of No. 3 appeared to grow faſter at firſt than thoſe of either of the others, they were likewiſe of a paler colour. When the Worms ſhowed ſigns of their being about to ſpin, they were put each worm into a paper caſe, marked with the number of the pan from which it was taken. As ſoon as I found they had all completed their web, and were changed into the chryſalis ſtate, after taking them all out of the paper caſes in which they had ſpun, I ſelected twelve of the largeſt and fineſt of the cocoons of each ſort, and weighed each dozen ſeparately: the twelve

No.

cocoons of No. 1 weighed ſeven penny-weights two grains; thoſe of No. 2 weighed ſix pennyweights three grains; thoſe of No. 3, ſix pennyweights.

From this experiment, as far as it goes, the white mulberry appears in the moſt favourable light; yet I would not be underſtood to inſinuate that I think this experiment at all deciſive: a ſingle experiment, generally ſpeaking, proves nothing; beſides, it ſhould have been carried further; the ſilk ſhould have been carefully reeled off the cocoons, and the weight of that taken ſeparately, as well as the comparative ſtrength of it proved.

As a counter-balance to the apparent ſuperiority of the white mulberry, it is poſſible that chryſalides ſelected of No. 1 might have been moſtly females, or proportionably more ſo than thoſe of the other numbers; and then (the females being always larger than the males) the difference in weight

had been in the worms, and not in the ſilk. On the contrary, as an additional circumſtance in favour of the white mulberry, it may with reaſon be alledged, that the leaves, having been taken from trees which had been ſo lately planted, and which were kept alive by much watering, by mere force (as it may be called), could not be ſuppoſed to contain their proper juices, at leaſt in ſufficient abundance. My principal reaſon for not proceeding with the experiment, as above directed, was, that the cocoons of No. 1 were ſo viſibly the fineſt I had, and at the ſame time having but few of them, I was willing to ſave the chryſalides contained in them, for breeding; and that they might not be at all injured, I thought it moſt adviſable to ſuffer them to remain in their ſilken tombs, and to make their way out thence in the method they are taught by Nature: this method, I believe, is conſtantly termed, eating their way out.

The term is improper; they are ſo far from eating their way out, that I have reaſon

ſon to believe, when the ſilk is of its due ſtrength, they never interrupt the continuance of the thread. As ſoon as the moth has burſt from the ſhell of the chryſalis, and is fully formed, it ejects from its mouth a liquid, which, being abſorbed by that part of the cocoon oppoſite, diſſolves the natural gluten by which the threads were made to adhere together; when the inſect, with its hooked feet, draws the thread aſide: by this means, and butting its head forward, it gradually makes an opening, ſufficient to force itſelf through. The elaſticity of the ſilk, as the moths creep through, has the effect of preſſing out a kind of red meconium, no doubt greatly to their advantage, ſince I have obſerved that thoſe which have been taken out of the cocoons before their laſt metamorphoſis, have got rid of it with much difficulty.

I have taken the pains to unravel ſeveral of the cocoons after the inſects had left them; but I never could find that the thread

was discontinued in any one instance, unless where I broke it myself: it was often so much entangled that I could not proceed; yet sometimes I have wound off nearly the whole web. Whenever this is attempted, it must be with the silk dry, as it will be immediately entangled when put in water.

It has been remarked,* "that in Italy "the chrysalides soon come to life; and it "is necessary to destroy them, lest, by eating their way out, the should injure the "silk; and, to effect this, they are placed "in heated ovens: that in our climate, "where every progression is slower, there "is sufficient time to wind off the silk, "without killing the chrysalis; that the "warmth of the ovens, and the length of "time necessary to keep them there, must "greatly injure the silk. But this is not "all; for in Italy they suffer the moth to "eat its way out of the largest cones, in "order

* See Miss *Rhodes*'s Letter, Vol. IV. page 157.

" order to have eggs from the moſt healthy,
" and thereby loſe all the ſilk in thoſe cones.
" That in this country the ſilk may be ga-
" thered, as well as the moths preſerved;
" and that thus we poſſeſs two ſtriking
" advantages, which amply compenſate for
" the loſs of many others."

That the inhabitants of this Iſland would poſſeſs ſome advantages in the raiſing of raw ſilk, which thoſe of many of the ſilk countries do not poſſeſs, I have not the leaſt doubt. I am informed by Arthur Young, Eſq; who was in France the laſt ſummer, that, even in the ſouth of France, the froſts are the great enemies which kill the mulberry leaves, after they are out. As this is ſcarcely ever the caſe with us, I conſider this as one very great advantage; and a freedom from lightning, and from ſultry and intenſe heats, which are allowed on all ſides to be exceedingly prejudicial to ſilk-worms, I eſteem to be another. There may be ſome few more. But with all due

deference to the ingenious remarks above quoted, I muſt beg leave to ſay, that I cannot think the advantages therein mentioned, to be very conſiderable: one reaſon may be deduced from the above, why it would be moſt adviſable to ſuffer thoſe inſects which are intended for breeding, to proceed in their own natural way, without any interruption or impediment, as they do in Italy: another reaſon is, that I have conſtantly obſerved that thoſe chryſalides which have been taken out of the cocoons before their laſt change, and have been placed in bran, cotton, or the like, have always had their ſhells conſiderably dried; and that the moths have had great difficulty in caſting them off, and have appeared much weakened by it.

The great point of utility in introducing the buſineſs of raiſing raw ſilk, would be to find employment for women and children in the winter months, and in bad weather, when they could not work in the open air; and

and not to crowd the ſummer months with more employment, which are already too much crowded. Add to this, that, were no more ſilk to be raiſed than what could be reeled off between the caterpillar and the moth ſtate of the inſect, it would ſeem to be an object ſcarcely worth attending to.

That the dry heat of the ovens is often injurious to the ſilk, I can readily conceive; for though it be poſſible to regulate the heat, by means of thermometers, yet this, I apprehend, is ſeldom, perhaps never, done. But the mere killing of the worms is not the ſole intention in placing the cocoons in heated ovens, and ſtoves; for, were the inſects to be inſtantaneouſly killed, (ſuppoſe by the electric ſhock, the fumes of burning ſulphur, or the like) and not to be quickly placed in ſome very drying ſituation, putrefaction would immediately enſue, and the ſilk would inevitably be ſpoiled.

One of the moſt definite degrees of heat known in chemiſtry* is that of boiling water. This is a heat which the ſilk muſt, more than once, be expoſed to (in dying, &c.) before it becomes an article of apparel; conſequently is a heat which it can ſuſtain without injury.

Could this heat be applied ſo as to kill the chryſalides, and the cocoons be immediately placed in warm dry rooms, it would ſeem to preclude the neceſſity of placing them in hot ovens.

Miſs Rhodes has repreſented this heat to be inſufficient for the purpoſe. An experiment which I made laſt ſummer, ſeems to ſpeak a different language: having placed upwards of one hundred cocoons on a piece of netting, ſtretched on a ſmall ſquare frame, I covered them with one of the gauze-bottomed drawers above mentioned; and, having poured out a tea-kettle of boiling water into a wooden veſſel, I immediately immerſed

* See Dr. Watſon's Chemical Eſſays.

immerſed the frame with the cocoons in the water, and continued it in that ſituation exactly three minutes: I then drew it out, and ſuſpended it from the cieling in the kitchen, at no great diſtance from the fire; it was ſuffered to remain there till it was judged that the cocoons, as well as the inſects contained in them, were perfectly dry; they were then removed.

Not one of theſe cocoons has been perforated by its entombed inſect; ſeveral of them have been opened, and each chryſalis has been found to be a mere huſk. It ought to be noticed, that the water, by paſſing through the cool air, and being received in a cold veſſel, was conſiderably below a boiling-water heat.

I am your and the Society's

obliged and obedient humble ſervant,

G. SWAYNE.

Pucklechurch,
May 26, 1788.

Mr. MORE.

DEAR

DEAR SIR,

THE high honour, and very flattering teſtimonial of their approbation, which the Society of Arts have conferred on me, by a vote of their Silver Medal, for my communications on the ſubject of Silk-worms, demand and receive my moſt grateful acknowledgements; and will, I truſt, operate with me as a powerful incentive to an unceaſing, and even an increaſed attention to the ſubject.

Having, in the courſe of laſt ſummer, obtained ſome farther experience in this line, I beg leave to trouble you with the reſult of it.—When I firſt conceived the idea of an apparatus of the kind I ſent you, my original and chief view was, by means of it, to introduce the rearing of ſilk-worms among the poor. I was well aware that their little cottages are, for the moſt part,

ſo

ſo much thronged and incumbered already, that they would be very averſe to admit of any additional incumbrance, which the feeding of ſilk-worms in their houſes would unavoidably occaſion: I therefore imagined, that, if ſmall portable frames could be contrived, which might ſtand in their gardens by day, and be removed in the evening, and hung up, during the night, to the beams and cielings of their little cabins, and be from thence removed again in the morning, the inconvenience would be very trifling; and ſuch contrivance would be a conſiderable preliminary ſtep towards the attainment of the object in view: but at the ſame time I conſidered that it would not be ſufficient to obviate the ſuppoſed objection ariſing from incumbrance. It would be equally neceſſary that ſuch an apparatus ſhould be obtainable at a cheap rate: a frame, ſimilar to that I ſent you, I was certain would not anſwer in that reſpect. Since that time I have experienced that the gauze bottoms are not of much uſe, as the trouble of cleaning

the

the worms whilſt they are very young, is not conſiderable; and I have farther experienced that netting may be ſubſtituted with advantage, in the room of wicker bottoms, which is the chief part of the expence. The meſhes of the netting, which I have made uſe of, were about half an inch ſquare; yet I do not know that this is the moſt proper dimenſion.

I believe I mentioned in my laſt, that I had got a frame, ſurrounded with a coarſe canvas (ſuch as is frequently made uſe of for window-blinds), in which I intended to repeat an attempt which I had before made to rear ſome worms in the open air. To thoſe who have imbibed a notion that the ſilk-worm is a very tender inſect, and that this climate is utterly incongenial with its delicate conſtitution, ſuch an attempt will doubtleſs appear only as no other than an idle dream of a viſionary projector.

From having ſome years ago reared numbers of our native inſects, of the ſame order

(*inſecta*

(inſecta lepidoptera) with the ſilk-worm, I have convinced myſelf that the ſilk-worm is not of a more tender nature, and can be reared with leſs difficulty, than moſt of the inſects of the ſame kind, in the breeding of which I have had any experience: and, as far as I can rely upon the ſucceſs of one experiment, I am equally ſatisfied that the ſcheme of rearing them, in ſuch frames as I have before mentioned, placed in the open air, is exceedingly feaſible.

In the latter end of laſt May (the 28th) I put a number of ſilk-worms (fewer than an hundred) which were then juſt hatched, in the frame, and placed it in my garden; the weather at that time was cold and windy: in the evening the frame was removed into an out-houſe, and returned to the garden next morning: this was continued for a night or two, for a few nights longer. It was covered with a baſs mat, and afterwards was ſuffered to remain in the garden, by day and night, without any covering.

covering. At the time I placed theſe in the garden, I placed others (a ſomewhat larger number) in the dwelling-houſe: both colonies were fed with the ſame kind of food, which was moſtly the leaves of the white mulberry, at the ſame time, and in a proportionable quantity; and were treated alike in every particular: during their growth there was no diſcernible difference between them; they went through their ſeveral changes, and began to ſpin about the ſame period; indeed the firſt that ſpun was in the frame in the garden.

The weather, during the laſt three weeks, was very wet, and, during the whole time, unſeaſonably cold: as ſoon as I obſerved one of them in the frame begin to ſpin, I took the frame within doors, as the weather was ſo wet that, had it remained in its former ſituation, I ſhould not have been able to have attended to the ſpinning of the worms without great inconvenience.

The

The ſilk I have incloſed, is the production of the worms which were bred both without and within doors. No. 1 and 2 is the ſilk of thoſe bred in the garden—No. 3 and 4, of thoſe in the houſe.

The different appearance of the orange-coloured ſilk, No. 3, is owing to a different management, prior to, and in the reeling it. It is the ſilk of thoſe cocoons, the chryſalides of which I preſerved for breeding, and ſuffered to eſcape from them in their own natural way: it was firſt wound off on bobbins ſingly, and afterwards reeled off from thoſe bobbins, and in the reeling paſſed through warm water; but the ſilk not being any length of time in the water, and not being ſo much ſtretched on the reel, did not take ſo gloſſy an appearance from the operation.

I had the ſatisfaction of winding off more than one of theſe cocoons, without once breaking the thread, or finding it diſcontinued.

tinued. The reaſon why I choſe the worms which ſpun the orange-coloured cocoons, bred within doors, for continuing the breed, was, that I originally intended to ſend you the ſilk of all the worms bred in the garden, and had reeled it off for that purpoſe: and I preferred the ſilk of that colour, as thinking it ſtronger than the ſtraw-coloured. At that time I had it not in my thoughts to reel off the other at all.

The worms which I firſt poſſeſſed, ſpun invariably a ſtraw-coloured ſilk. By chance I had a cocoon of an orange colour given me, the moth from which happened to be a female; from this, with the coition of a ſtraw-coloured male, were propagated all that I have of the orange colour. It ſhould ſeem, therefore, that the colour of the ſilk depends chiefly upon the female worm.

One of my white mulberry trees, the laſt ſeaſon, made amazing ſhoots; ſome more than five feet, and many more than four feet,

feet in length. I have uſed great attention, and made ſeveral experiments to make the cuttings of the mulberry-trees grow, but hitherto without ſucceſs. I have lately heard that an old bough takes root much freer than a one-year's ſhoot. I have procured a conſiderable quantity of ſeed, the late ſeaſon, from trees in this neighbourhood; and have got a friend to procure me ſome in Oxford, where the ſoil is peculiarly favourable to the growth of mulberry-trees: theſe I mean to ſow the enſuing ſpring: whether they will grow, or not, time will diſcover; but at preſent I have great hopes that they will, as they appear quite perfect, and are in good preſervation.

What has been ſaid reſpecting the leaves of the mulberry-tree being free from the depredations of every indigenous inſect, muſt be confined to the black mulberry. The firſt ſummer after I had planted my white mulberry-trees, I found that the leaves

were many of them devoured by night. It was a long time before I diſcovered the plunderers: at length they proved to be earwigs, which, in that ſeaſon, were uncommonly numerous: yet, even then, the black mulberry-leaves were untouched. The white mulberry is certainly of a more delicate frame and texture than the black; particularly in the bark, which is very liable to canker: nor do I obſerve that it is much earlier in leafing than the black. The leaves are undoubtedly more delicate, and free from that roughneſs, or lanugo, in which the leaves of the other are enveloped; and, perhaps for this reaſon, are more palatable to the worms when very young; but then, as they are much leſs ſubſtantial than thoſe of the black, they get dry much ſooner, and conſequently require to be oftener renewed.

In a plantation it would be adviſable to have a few of theſe, if it were only for the

ſake

ſake of variety: but, upon the whole, the black mulberry-tree is, in my opinion, for the purpoſe of feeding ſilk-worms, by much the moſt preferable.

I am, SIR,

Yours and the Society's

Much obliged

and obedient humble ſervant,

G. SWAYNE.

Pucklechurch,
Dec. 26, 1788.

Mr. MORE.

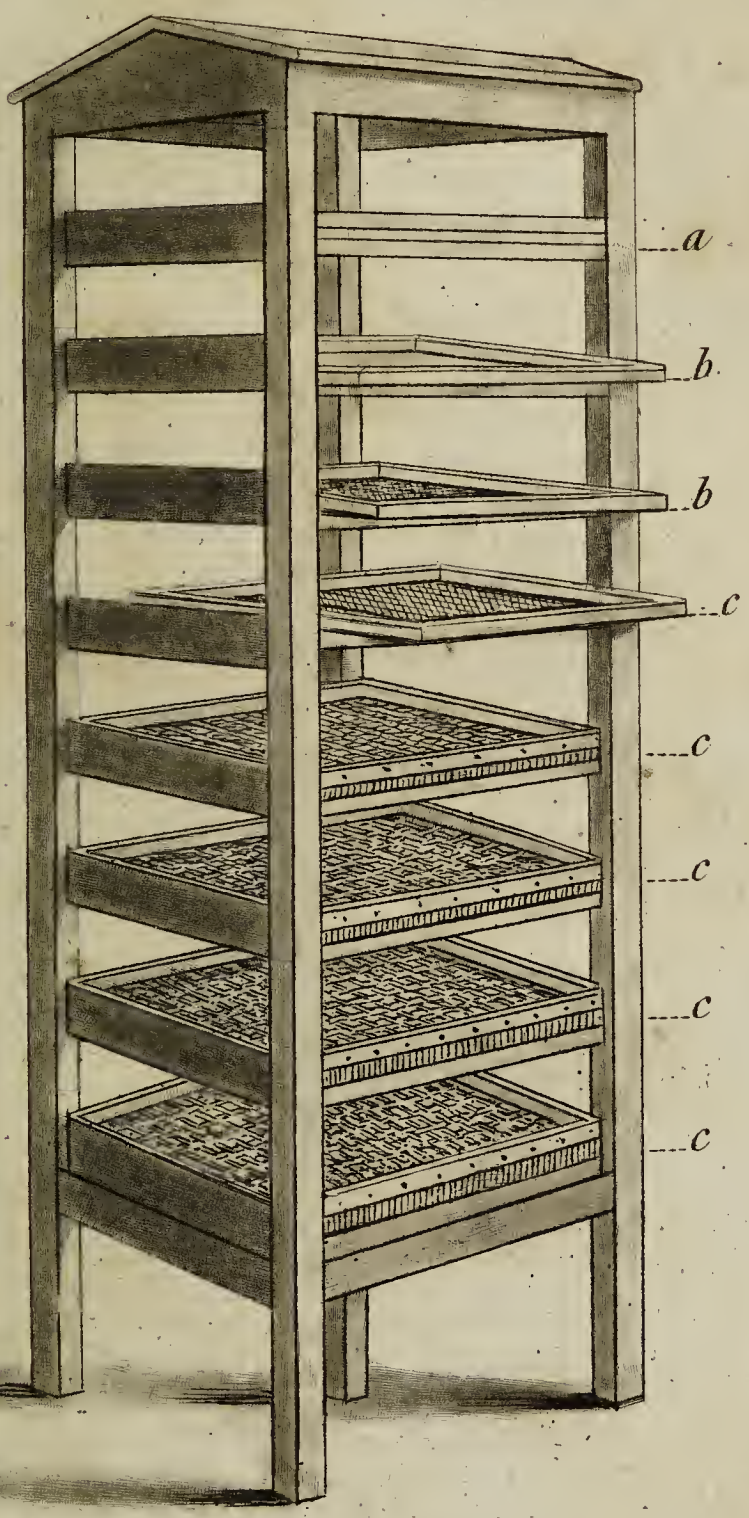
DESCRIPTION *of the Plate of the Apparatus for breeding* SILK-WORMS, *contrived by the Rev. Mr.* SWAYNE, *of* Pucklechurch, *near* Briſtol.

THE Apparatus conſiſts of a wooden frame, four feet two inches high, each ſide ſixteen inches and a half wide, divided into eight partitions, by ſmall pieces of wood, which form grooves, into which the ſlides run, and are thus eaſily thruſt into or drawn out of the frame. The upper ſlide *(a)* in the Model ſent to the Society by Mr. Swayne, is of paper only, and deſigned to receive the worms as ſoon as hatched; the two next *(b, b,)* are of catgut, the threads about one tenth of an inch diſtant from each other; theſe are for the inſects when a little advanced in ſize: the five lower ones, marked *c, c, c, c c,* are of wicker work; the openings through which the dung is to fall, being about one quarter of

an

Plate I.

The Rev.d Mr. Swayne's apparatus for rearing Silk Worms.



an inch ſquare. Under each of theſe, as well as under thoſe of catgut, are ſliders, made of paper, to prevent the dung of the worms falling on thoſe feeding below them.

This is a Deſcription of the Apparatus, as reſerved in the Society's Repoſitory; but, as Mr. Swayne ſeems to have made ſome uſeful alterations in the manner of conſtructing the ſlides ſince this was ſent, it may be neceſſary for thoſe who intend to adopt his method of rearing and feeding ſilk-worms, carefully to attend to what that ingenious Gentleman has communicated in the foregoing Papers.

THE Society having been favoured with the following Letters from the Right Honourable Lord ROMNEY, their Preſident, and having examined the ſeveral ſamples of the Spinning ſent by Mr. GATES, preſented their SILVER MEDAL to Miſs ANN IVES, as a mark of their approbation of her ingenuity and perſeverance in bringing the art of Spinning Wool to ſo great a degree of perfection.

A ſample of the fine Spinning, together with a Spindle and Whirl ſent by Miſs IVES, and a piece of a Shaul, from Mr. HARVEY of Norwich, are reſerved in the Society's Repoſitory.

My Lord,

As I know you are a great promoter of arts, ſciences, and induſtry, I hope you will excuſe the liberty I take in ſending you a ſkain of wool, and a pattern of a gown ſpun by Miſs Ann Ives, of Spalding. I beg leave to obſerve to your Lordſhip, that Miſs Ives ſpins only for her amuſement; was a learner about two years ſince, and laſt winter finiſhed the gown, (the only thing of her ſpinning that has been manufactured), a pattern of which was ſent to Sir Joſeph Banks, who had before called on her, to ſee her ſpin. Sir Joſeph wrote her, for anſwer, the 8th of laſt March, that it was the fineſt he had ſeen; and that the fineſt ſpinning he had heard of, was done by a Mary Powley, of Eaſt-Deerham, Norfolk, in 1754, which was one hundred and fifty ſkains to a pound, only adding a ſixpence

to the weight (which I am told was ſold for one guinea a ſkain, and that a perſon of this town bought one at that price). This raiſed an emulation in Miſs Ives to excel her: and Sir Joſeph ſaw her laſt Auguſt ſpinning our long Lincolnſhire, a ſkain of which weighed two drachms two grains, and is about one hundred and twenty-three ſkains to the pound: he ſaid that he was ſenſible that ſhe could not ſpin that finer.

About ſix weeks ſince, Sir Joſeph brought Miſs Ives ſome finer wool, the growth of Lincolnſhire; being, as I am informed, from a mixed breed of his Lincolnſhire and Spaniſh ſheep; of which this ſkain is a ſpecimen: it weighs thirty-ſeven grains, which is one hundred and ninety-four ſkains to a pound; was ſpun in two days, and is ſuppoſed to be the fineſt ſkain of wool ever known to be ſpun: this Miſs Ives has done by an improvement ſhe has made, by ſcraping

ping the ſpindle ſmall, with glaſs (for ſhe ſpins with the ſpindle and diſtaff); ſo that the ſpindle with which this ſkain was ſpun weighed only fourteen grains, and the whirl eighteen grains; together, one drachm four grains: whereas the former ſpindle and whirl weighed above four drachms, and broke the wool ſo, by its weight, that it not only retarded her ſpinning, but made the ſkains ſo much heavier that ſhe could not get one to one hundred and forty ſkains to a pound, though the ſame wool as the ſkain now ſent, which is thirty-ſeven grains, and one hundred and ninety-four ſkains to a pound. How far the weight of the ſpindle and whirl may be improved, and what the event of her ſpinning will be, time muſt ſhow.

The laſt ſkain except this, was after the rate of one hundred and eighty-ſeven to the pound; and was ſent on Saturday to Sir Joſeph Banks, who, in his anſwer of Dec. 3, ſays

ſays ſhe has carried the art of ſpinning to a degree of perfection unknown, he believes, at any former period; and intreats her to go on to a greater degree of perfection, as he thinks ſomething muſt ariſe, from her exertions, to the advantage of Britiſh manufactures. Miſs Ives intends to proceed, and I make no doubt will make further improvement; perhaps ſome further alterations in the ſpindle and whirl. The ſpindle is very difficult to ſcrape ſo fine; even a quarter of a grain, or leſs, in ſome parts, prevents it from working well: the whirl alſo muſt be exact; which may be tried in a glaſs of water, to ſee if it ſwims level.

Sir Joſeph went from hence to Norwich, and writes to Miſs Ives, That he is ſorry to ſay, he can hear of no manufacturer in this kingdom that can weave this ſpinding of hers.—Since Sir Joſeph was there, a friend of Miſs Ives's has been with Mr. Harvey, the weaver, to whom Sir Joſeph applied; and

and he gives her expectation it may be done. A few yards, on a card, were ſent, from a ſkain of one hundred and ſeventy to the pound, with a ſkain of one hundred and fifty-two to the pound, to know Mr. Harvey's opinion on them, whether he can weave them or not. If it does not ſucceed, I hope ſome other artiſt will be found, to do juſtice to my young friend's great induſtry and exertions in ſpinning: but, whether ſhe meets with ſucceſs in the weaving, or not, if your Lordſhip will but countenance her with your approbation, I am certain ſhe will think herſelf amply rewarded for all her trouble. I apprehend the ſkain may gain three or four grains this moiſt weather: I thought proper to mention this, that it may be dried a little before it is weighed. I have underneath ſent your Lordſhip Miſs Ives's calculation of her weights and meaſures, for want of which Sir Joſeph Banks could not make out the number of ſkains. Permit me now again to aſk your Lordſhip's pardon, for thus intruding upon you; but

but I hope my intention, which is for the public benefit of the woollen manufacture, will be allowed of as an excuſe.

I remain, with the greateſt reſpect,

My Lord,

Your Lordſhip's

moſt obedient ſervant,

R. Gates.

Spalding, Dec. 21, 1787.

Avoirdupoiſe.

The pound is 16 ounces.
The ounce is 16 drams.
The drachm is 28 grains, by Miſs Ives's drachm.

The ſkain contains ſeven leas; each lea contains eighty yards; and a ſkain contains five hundred and ſixty yards. One hundred and ninety-four ſkains in a pound, will reach about ſixty-one miles and three quarters. Miſs Ives weighs to the eighth of a grain.

The Right Hon. Lord Romney.

My Lord,

I WAS honoured with the favour of your letter of the 10th inſtant, from Bath, which I immediately communicated to Miſs Ann Ives, who deſires me to preſent her moſt reſpectful compliments and thanks to your Lordſhip, for the great honour you have done her, in approving of her ſpinning: ſhe has no objection to the ſkain being ſent to the Society of Arts, &c. as ſhe moſt ſincerely wiſhes her endeavours may prove of public advantage, and excite an emulation in other ſpinners to equal her. She has deſired me to incloſe another ſkain, ſomewhat finer than the laſt, being two hundred and nine ſkains to a pound; which ſhe begs your Lordſhip will accept from her, as it was ſpun on purpoſe for you: it weighs thirty-four grains and one eighth, and was finiſhed yeſterday.

I waited

I waited for the ſkain, or I ſhould have anſwered your Lordſhip's letter ſooner. I took three ſkains, one of two hundred, one of one hundred and ninety, and one of one hundred and eighty-eight, to the pound, on an average one hundred and ninety-two ſkains to the pound; which weighed, by Miſs Ives's ſcales and weights, and at another place, rather leſs than a quarter of an ounce: at two other places, by the ſeveral weights at them, they wanted two grains and a half of a quarter of an ounce. They are entered down in their three ſeparate ledgers, and Miſs Ives's book: ſhe reckons ſeven thouſand one hundred and ſixty-eight grains to a pound, which ſhe divides by the number of grains the ſkain weighs; and it ſhews the number of ſkains in a pound. If the ſkain now ſent had weighed exactly thirty-four grains, it would have been two hundred and ten grains twenty-eight thirty-fourths to a pound. She is obliged to be very exact in her weighing, even to a ſixteenth of a grain; for one grain, at two

hundred and nine ſkains to a pound, makes ſix ſkains difference. I hope you will excuſe my being thus particular, as it ſhows Miſs Ives's calculations; the quarter of an ounce proving the exactneſs of the grains.

Miſs Ives ſays, ſhe apprehends it will be neceſſary that the Society ſhould have a ſpindle and whirl ſent up as a model; and ſhe will ſend one to Mr. More, as ſoon as ſhe gets ſome ſpindles from Norwich; for ſhe cannot get any made in this town, or neighbourhood. As the ſpindle is ſo ſmall, it muſt be of very tough wood, or it will break, either in the ſcraping, or very ſoon in ſpinning. She has made one of whalebone, but it will not do: there is a ſpring in the whalebone, which prevents it turning ſteady: perhaps ſome method may be thought of to ſtiffen the whalebone; or ſome very tough wood found, that will not eaſily break. The ſpindle this ſkain was ſpun with, has laſted eight or ten days; and ſhe the week before had four broke one afternoon.

afternoon. Miſs Ives has ſome doubt of her ſpinning being wove: ſhe wrote to Mr. Harvey, of Norwich; but has not had an anſwer. If he cannot do it, I hope ſome artiſt will be found to do Miſs Ives's ſpinning juſtice.

I have the honour to be, with the greateſt reſpect,

My Lord,

Your Lordſhip's

Moſt obedient ſervant,

R. Gates.

PS. Your Lordſhip will be pleaſed to lay this ſkain before the fire, a ſhort time before you weigh it; as I do ſuppoſe it will gain, this damp weather, two or three grains in coming to you.

Spalding, Dec. 21, 1787.

The Right Hon. Lord Romney.

My

My Lord,

MISS Ives desires me to inform your Lordship, that she intends to spin the shaul to twelve skains to an ounce; thirty-six skains of which she supposes will make a shaul one yard and a half square; which may weigh about two ounces, according to the following instructions of Mr. Harvey, which she received some time since.

"Thirty-six skains, from one hundred "to one hundred and twenty skains to a "pound, will make a shaul one yard and "a half square, which will weigh about "three ounces."

In this Mr. Harvey requires thirty-six skains, which will weigh about five ounces; and to come back, three ounces: though Miss Ives apprehends it will weigh back

about three ounces and a half, according to her gown and petticoat, for which four pounds were ſent; and weighed, when it came back, three pounds: the warp of it was doubled and twiſted, and the woof ſingle. A ſhaul of it, one yard and a half wide, will weigh about eight ounces: and, as ſhe propoſes ſpinning now almoſt four times finer, ſhe hopes this will not weigh more than two ounces. But this is only conjecture.

I am, with the higheſt regard,

Your Lordſhip's

moſt dutiful and obedient ſervant,

R. GATES.

Spalding, Dec. 28, 1787.

The Right Hon. Lord ROMNEY.

SIR,

SIR,

YOUR favour of the 4th I received; and acquainted Miſs Ann Ives with the reſolutions of the Society; who deſires her reſpectful compliments, and thanks, to the Preſident, Vice-Preſidents, and other Gentlemen, for the honour they intend her; and to you, Sir, for your polite communication thereof to her.

I will take care to ſend you a ſpindle and whirl, and ſome of her ſpinning, done with the ſpindle and whirl which I ſend. Miſs Ives could not get ſpindles, or you ſhould have had one ſooner. She has juſt received ſome from Norwich:—no perſon turns any here. And thoſe which come from Norwich are afterwards ſcraped fine, with glaſs, by her youngeſt ſiſter.

Miſs Ives has had great difficulties to ſurmount, before ſhe could bring her ſpinning to this perfection. She has great ingenuity, and excels in moſt things ſhe attempts; is very induſtrious, and has the greateſt patience I ever ſaw. I have ſeen her ſpin, before her ſpindle was reduced, for an hour together, when the thread broke, by the weight of the ſpindle, at every twirl, and ſhe was obliged to ſtoop, to take it off the ground: and I am informed ſhe ſpun in this manner ſeveral days together. She had no inſtructor, but has inſtructed ſeveral.

I will trouble you with a letter, when any thing material occurs relating to Miſs Ives's ſpinning; as ſhe deſires every thing may be known about it, that may be of public utility.

Miſs Ives keeps up a correſpondence with Sir Joſeph Banks, who gives her wool. She ſent him a ſkain which weighed half a grain

grain leſs than one drachm avoirdupoiſe (the ſpindle thirteen grains, and whirl nine grains), being two hundred and ſixty ſkains to a pound. This ſkain took ſeven days ſpinning; was manufactured at Trowbridge. The warp being ſilk, this does not look ſo much like an Eaſt-India ſhaul as one of a ſkain of one hundred and forty-ſeven to a pound, woven by Mr. Harvey, of Norwich, the warp alſo of ſilk. Mr. Harvey has engaged to weave a ſhaul, one yard and a half ſquare, all of wool of one hundred and eighty ſkains to a pound, to be doubled and twiſted for the warp; and the ſame ſingle, or finer, for the woof. This, I think, will take Miſs Ives ſome time to ſpin; as ſhe muſt have ſome amuſements, leſt too cloſe application ſhould injure her health.

I ſhall be much obliged to you, when you write, if you can inform me how to ſtain wheat-ſtraw, of variety of colours, ſuch as blue, green, red, &c. It is

for Miſs Ives, who has made ſeveral attempts to ſtain wheat-ſtraw, but cannot attain that art.

I have the honour to be, with the greateſt reſpect,

SIR,

Your moſt obedient ſervant,

ROBERT GATES.

Spalding, April 8, 1788.

P.S. The above ſkain ſent to Sir Joſeph Banks, was ſpun after that ſent to Lord Romney: and Miſs Ann Ives ſtill makes greater improvement in the art of ſpinning.

Mr. MORE.

SIR,

SIR,

I HAVE the honour of your letter of yeſterday; and am proud to be enabled to give any information to the Society for the Encouragement of Arts, &c. more particularly ſo upon an article that has ever been ſo juſtly conſidered the ſtaple of this kingdom.

In the courſe of laſt ſummer Sir Joſeph Banks obligingly gave me ſome yarn, ſpun by Miſs Ives, of Spalding, from Lincolnſhire wool: and, a few weeks ago, that lady moſt politely favoured me with another ſpecimen; which far exceeded, in fineneſs of ſpinning, any yarn I had ever ſeen. One pound weight of this yarn contained two hundred and fifty-ſix ſkains, each five hundred and ſixty yards long, making one hundred and forty-three thouſand three hundred and ſixty yards (equal

to eighty-one miles and eighty yards in length); the value of which, taking the price of the wool prepared for ſpinning at one ſhilling and three-pence, would be two pounds, without allowing an extra price for the ſuperior ingenuity of the ſpinning, making the value of labour, in two proceſſes only (combing and ſpinning), thirty-two per cent. Yarn ſpun ſo very light as the above-mentioned, from ſo coarſe a material, is rather curious than uſeful; for though it would make ſtuff very thin and fine, it would not be ſufficiently ſoft and ſilky. It equals, in fineneſs of thread, the yarn of which the Indian ſhauls are made; but it bears no compariſon to its ſoftneſs and ſilkineſs. The wool of the Thibet and Caſhmire ſheep, from which the ſhauls are made, is ſoft and ſilky to a wonderful degree, and yet of ſufficient length to bear combing. I have the pleaſure to incloſe a ſample of this wool, which I requeſt may be laid before the Committee, who will immediately

diately perceive the difference between that and the fineſt Engliſh combing wool.

In a manufactory of ſhauls which I have invented, my conſtant endeavour has been to procure wool ſufficiently ſoft. I have made uſe of Spaniſh and Norfolk flock-wool mixed: this has been attended with great inconvenience and expence; as a pack of Spaniſh wool has not afforded me more than twenty, or twenty-four pounds, of a ſtaple long enough for combing. I have ſince found that the fineſt part of the Norfolk fleece, culled of ſufficient length, is full as ſoft as the long ſtaple of the Spaniſh, and is ſuperior in whiteneſs of colour.

It is not a well aſcertained fact, that the climate principally affects the nature of wool; and I am rather inclined to believe, that the feed and ſituation being wet or dry, more materially alters the quality. It is notorious

notorious that the large Lincolnſhire marſh-fed ſheep, brought into Norfolk, and fed upon dry heaths, will, in the courſe of four or five years, completely change their breed, and produce a wool like the native Norfolk ſheep.

The Spaniſh ſheep from Andaluſia and Segovia, produce the fineſt clothing wool on the Continent. Thibet and Caſhmire, though in the latitude of 30°, 34′, is extremely cold. The ſheep produce a wool that is long, ſilky, and ſoft as the eider-down. In the Orkneys the wool is very ſhort, and of a fine texture.

I regret that I have not been able to methodiſe this ſubject; but the little time you have afforded me to reply, muſt ſerve as an apology.

Any circumſtance or information reſpecting the ſubject of wool, is peculiarly intereſting

intereſting to me; being a partner in a houſe that conſtantly employs from nine hundred to one thouſand perſons in the manufacture of woollen and worſted goods.

I am, SIR,

Your obedient humble ſervant,

JOHN HARVEY.

Norwich, 15 *March*, 1788.

Mr. MORE.

PAPERS

PAPERS

IN

MECHANICKS.

MECHANICKS.

IN the former Volumes of these Transactions, several accounts have been given of the invention of the Gun-Harpoon, and of the Rewards bestowed by the Society to promote the use of it. This year the following Letters and Claims having been received, Premiums of Two Guineas each were adjudged to John Mitcalf and Charles Fox, Harpooners, agreably to the advertisement published by the Society in 1788. And as, by the Letters of the Captains Wheatley, it appears that three Whales were killed by the Gun-Harpoon in 1785, four in 1786, and three in 1787, the Society, as an inducement to the more general use of the Gun-Harpoon, voted a Bounty of One Guinea for each Whale mentioned in those Letters; the money to be distributed to the Harpooners, in proportion to the number of Whales killed by each of them.

Gentlemen,

GENTLEMEN,

BEING lately informed it is your desire to encourage the use of the Gun-Harpoon in killing whales, I am induced to lay before you, for your consideration, two instances which occurred last season, in the ship Queen Charlotte, of London, under my command, in Davis's Straits.

June 11, 1787, Thomas Stinton, harpooner, struck a fish at the distance of seventy-two feet, or thereabout; there not being the least view of striking with the Hand-Harpoon, as the fish, to all appearance, was going down; run out three lines and a quarter, and was killed in two hours: at this time the line was fixed to the harpoon, by a wire shackle, laid in the manner of a rope.

June 25, 1787, James Brown, harpooner, struck a fish at the distance of

eighty-feet, or thereabout, there not being the leaſt view of ſtriking with the hand-harpoon, as the fiſh was, to all appearance, going down, ran out two lines and a half; was killed in one hour and a half: at this time the line was fixed by a ſtrop, made of foreganger, our wire-ſhackles being all broke by often firing; which laſt inconveniency I have found in a great meaſure removed, by fixing a piece of cork in the ſlit of the but-end of the harpoon, to ſoften the firſt ſhock of the wire, ſliding from one end of the harpoon to the other.

I am, GENTLEMEN,

Your moſt obedient

humble ſervant,

JAMES WHEATLEY.

Shakeſpear-Walk, Shadwell,
February 13, 1788.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

GENTLEMEN,

I HAVE been informed lately of the encouragement given by you for the uſe of the Harpoon-Guns, in the Whale-Fiſhery. I beg leave to lay before you the following inſtance of their utility, in the Britannia, belonging to Mr. John Thompſon, of London, under my command, during the three laſt ſeaſons, in Davis's Straits; in which time we killed fourteen large whales, and in all of which the guns have been the principal inſtruments of their deſtruction: eight of which were firſt ſtruck by the gun-harpoon; and the others, although not the firſt, were generally the ſecond and third: and often when a boat, with the common harpoon, dare not approach them, by reaſon of their throwing about their fins and tails, the gun, at a ſafe diſtance of eight, twelve, or fifteen fathoms, has

has given them their mortal wound. Our two guns are made by Staghold of Stratford.

The greateſt inconvenience we laboured under was the rain or ſnow, and ſometimes the ſea wetting the lock: to remove that obſtacle, I had a caſe of leather, lined with tin, to fit round the gun, and over the lock, big enough to fire the gun with the caſe on; ſo that we could fire in any weather: and found thimbles made of wire, twiſted in the ſlit of the harpoon, and a bit of cork in the upper end of the harpoon, to anſwer the purpoſe very ſafely and well.

Their uſes in calm and ſtill weather are very great; as a whale, although it is a timorous creature, will very often let a boat approach it to twenty, fifteen, and even ten fathoms, before it ſinks; all of which diſtances are in the reach of the gun, but none of them in the reach of the hand-harpoon.

July 9, 1785, George Leſlie ſhot, with the harpoon-gun, a whale, near ten feet bone, at about ten fathoms diſtance; the harpoon carried the line four feet into the body: it went down about fifteen minutes; came up blowing blood, and was killed on the ſpot.

July 10, 1785, Henry Alliſon ſhot a fiſh of eleven feet bone, at fifteen fathoms diſtance; which was killed in a very ſhort time: the weather was calm, and the fiſh going down.

July 12, 1785, Henry Alliſon ſhot a large fiſh, thirteen feet ten inches bone, at four fathoms diſtance: it lay almoſt without life, or motion, for ſome minutes: ſtruck in four harpoons and ſix lines; when it went down, and died at the bottom.

May 6, 1786, James Hagan (ſince dead) ſhot a fiſh of about ten feet bone, at fourteen fathoms diſtance: it ran out three lines

lines, and was killed in half an hour. It was calm; and no other chance of getting it but by the gun.

May 6, 1786, George Leſlie ſhot a fiſh of eleven feet bone, at eight fathoms diſtance, through the tail; when none of our boats durſt go nearer: it carried the line through the tail five fathoms, broke the harpoon in the ſlit. The fiſh rolled ſo much as to twiſt the line together like a rope; and did not draw back, though it ran out ſix lines, and was eight hours in killing. I have not heard of any inſtance of a fiſh being ſtruck over the feathers, in that part, ſo as to get it, the above excepted.

May 21, 1786, Benjamin Brown ſhot a fiſh, cloſe to the boat: the harpoon carried ſix feet of line into the body with it. Blowed blood like a torrent; and was killed in ten minutes.

May 22, 1786, Henry Alliſon ſhot a whale of twelve feet bone, at ten fathoms diſtance. It was calm, and the fiſh going down: it ran out four lines, and was killed in an hour.

April 28, 1787, Michael Matthews ſhot a fiſh, about twelve fathoms diſtance. It was calm, and the fiſh going down. There was another ſhip's boat, two fathoms nearer; but they could not reach it with a hand-harpoon: and we killed it in an hour.

I am, GENTLEMEN,

Your moſt obedient humble ſervant,

JOHN WHEATLEY.

Shakeſpear-Walk, Shadwell,
February 1, 1788.

To the Society for the Encouragement of Arts, Manufactures and Commerce.

GENTLEMEN,

GENTLEMEN,

I AM informed you have offered a Premium, as an encouragement for the uſe of the Harpoon-Gun, on the Whale-Fiſhery. I beg leave to certify to you the under-mentioned inſtance, this laſt ſeaſon, in the Blenheim, of London, under my command, in behalf and for the uſe of the Harpooner, as an inducement for others to follow his example.

Francis Mitcalf, harpooner, of the ſhip Blenheim, on the 14th of June, at 7 P. M. being nine or ten fathoms diſtant from a whale fiſh, and finding her going down, fired the gun-harpoon (made by Mr. Moore), and got faſt to her; and ſhe did

not run twenty fathoms of line out, before the boats killed her.

Given under my hand, this 22d of December, 1788.

JOHN MITCALF.

Fox's Lane, Shadwell.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

GENTLEMEN,

GENTLEMEN,

I AM informed you have offered a Premium, as an encouragement for the uſe of the Harpoon-Guns, on the Whale-Fiſhery. I beg leave to certify to you the under-mentioned inſtance, this laſt ſeaſon, at Davis's Straits, in the ſhip Simond, of Ipſwich, under my command, in behalf and for the uſe of the Harpooner; as an inducement for others to follow his example.

Charles Fox, harpooner, of the ſaid ſhip Simond, on the 16th of June, 1788, at meridian, being about ten or twelve fathoms diſtant from a whale fiſh, and thinking her going down, fired the gun-harpoon (made by Mr. Moore) over the ſtarboard bow of the boat, and got faſt to her; and ſhe ran out about two lines and a half;

a half; when two harpoons more were ſtruck into her; at which time the firſt, or gun-harpoon, came out, being broke by the obſtruction it met with againſt one of her ribs; which was alſo broke, and was the occaſion of her being ſo ſoon killed.

Given under my hand this 22d day of December, 1788.

ROBERT GORDON.

London-Street, Ratcliff.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

EVERY

EVERY improvement in the manufactory of Wool, the ſtaple commodity of this Kingdom, has been conſidered by the Society as highly meriting their attention; and this year the following Letters and Certificates, together with a Model of a Machine for Twitching Wool, (a work hitherto done by hand, and, from the films and duſt, highly prejudicial to the perſons employed in it) are received. A Plate of the Model is annexed; and the Model itſelf, for which a Bounty of TWELVE GUINEAS was given to Mr. HUGH HUGHES, the Inventor, is reſerved in the Society's Repoſitory for public inſpection.

GENTLEMEN,

GENTLEMEN,

I HAVE received the Model I now ſend, from Mr. Hugh Hughes, Millwright, of Coggeſhall, in the county of Eſſex, the inventor; who deſires me to preſent it to your Society; hoping, on inſpection, you will find it worthy of a reward; being truly authenticated from the principal Manufacturers, who have long been in want of ſuch a machine.

I am, GENTLEMEN,

With reſpect,

Your obedient and humble ſervant,

T. REEVES.

Holborn-Bridge,
Jan. 22, 1788.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

SIR,

SIR,

I RECEIVED your letter, dated the 8th inſtant; and, for anſwer, do inform you, that my firſt model of a machine for twitching of wool, was made of wood, on a two-inch ſcale, to find out the reverſe motion (which reverſe could never be effected, to any good purpoſe whatever, before, although it has been tried at for above thirty years paſt, by different perſons). But that model being too large and cumberſome to ſend to London, I applied to a clock-maker, to make a ſmall one, to ſhow the ſaid reverſe motion; which was the principal thing to be known: but he did not underſtand making it on a proper ſcale; for ſome parts thereof he made on a quarter-inch ſcale, and ſome on a half-inch ſcale.

My own machine, which is now at work, is at Mr. Richard White's, baize-maker, in Great Coggeſhall, Eſſex, whoſe horſe-wheel

wheel is ten feet diameter; and the next wheel, on the crank, is four feet diameter; and the wheel which drives the machine is four feet alſo, and drives four machines in work at once, three times backwards and forwards. It works to much greater advantage, and with more eaſe, than any machine hitherto diſcovered for this purpoſe; has little friction; may be worked by hand, by water, by wind, or by horſe; will be found very uſeful for driving calenders for glazing of cloth, &c. and I hope will prove worthy of your notice: and remain,

SIR,

Your very humble ſervant,

HUGH HUGHES.

Coggeſhall,
Feb. 12, 1788.

Mr. MORE,

SIR,

SIR,

IN reply to your favour of the 7th ultimo, the machine invented by Mr. Hugh Hughes, of Coggeſhall, for twitching of wool, I have uſed in my buſineſs for ſeveral months paſt; and find it to anſwer every purpoſe: therefore any favour the Society for the Encouragement of Arts, Manufactures, and Commerce, may confer upon him, I am confident he fully merits.

I am, SIR,

Your moſt humble ſervant,

RICHARD WHITE.

Coggeſhall,
Nov. 11, 1788.

Mr. MORE.

WE

WE whoſe names are hereunto ſubſcribed, do certify, That Hugh Hughes, of Coggeſhall, in the county of Eſſex, Millwright, has invented a machine for Twitching of Wool; which it performs in a very expeditious and complete manner: his machine is greatly ſuperior to any before conſtructed for that purpoſe; being found, by experience, the moſt uſeful one ever invented, for baize-makers, clothiers, and other manufacturers of wool.

October 15, 1788.

RICHARD WHITE,
STEPHEN UNWIN,
JOSEPH BOTT,
} Baize-makers, of Coggeſhall, Eſſex.

THOMAS NOTTIDGE,
JOSEPH NOTTIDGE,
} Baize-makers, of Bocking, Eſſex.

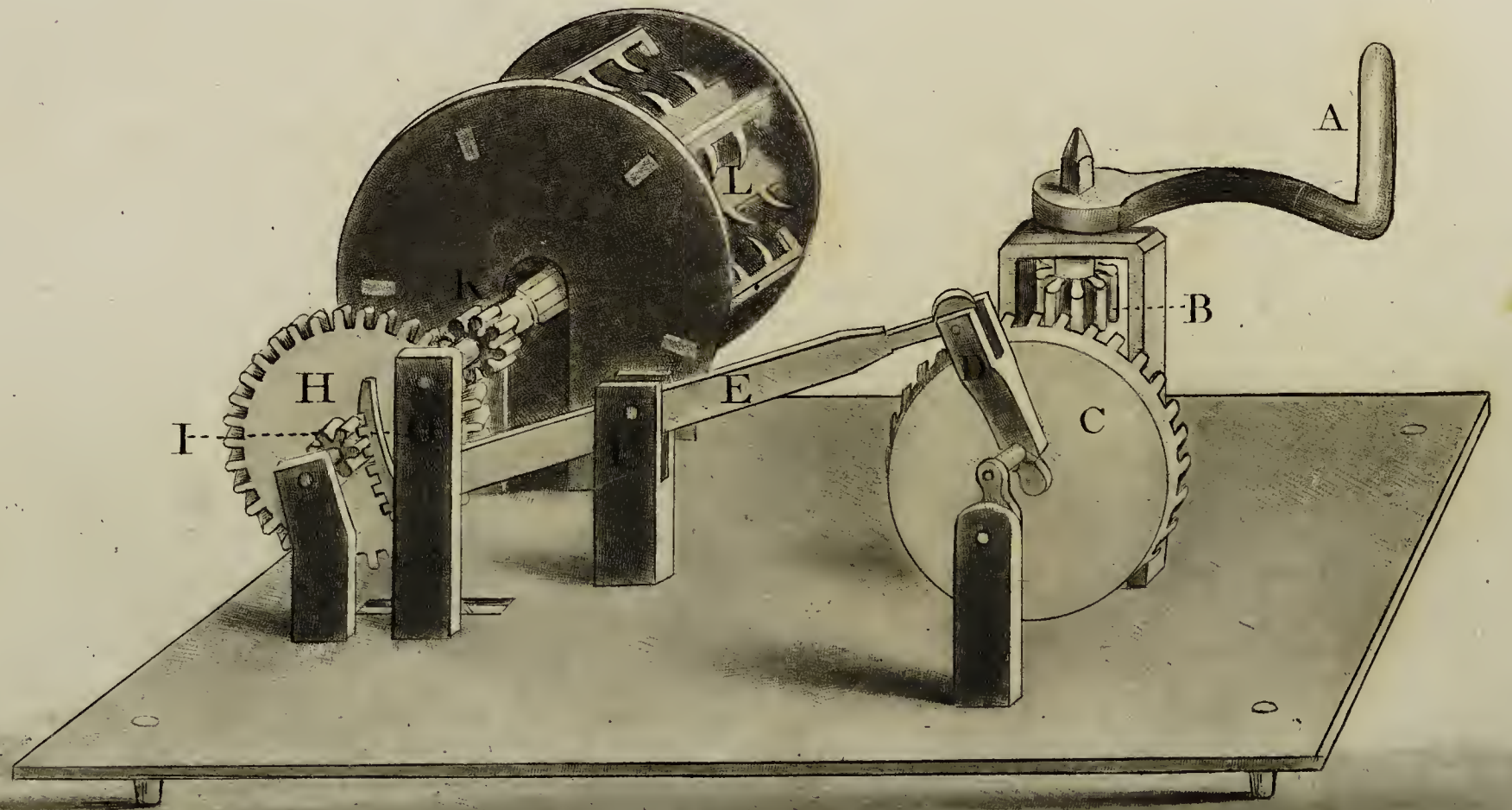
THOMAS BOGGIS, { Baize-maker, of Colcheſter, Eſſex.

THOMAS STUCK, { Baize-maker, of Halſted, Eſſex.

DESCRIPTION

Plate II.

Mr. Hughes's Machine for twitching Wool.



DESCRIPTION *of the Plate of the Model of Mr.* HUGHES'S *Machine for* TWITCHING WOOL.

A, the winch by which the pinion B is turned; this pinion taking into the teeth of the face-wheel C, on whoſe axis is the crank D, an alternate motion is communicated to the bar E, moving on an axis F; and thus the horſe-head G drives the wheel H to the right or left, as the teeth of the horſe-head take into the pinion I: and the teeth of wheel H, taking into the pinion K fixed on the axis of the twitching machine L, the fangs on the fliers are alternately driven, with conſiderable velocity, firſt one way, and then the other. In the Model, a cover is placed over the part into which the wool is put, ſo that it reſembles a box, as is neceſſary in the large works, to prevent the inconveniences ariſing from the ſmall particles of wool that are driven about,

during the operation, to the great detriment of the workmen employed in the hand-machines uſed before this contrivance of Mr. Hughes.

It will eaſily be ſeen, by any mechanic, how this machine may be fixed to a horſe-mill, water-wheel, &c.

As the word *twitching*, when applied to the preparing wool, appeared to be a local term, Mr. Hughes was deſired to explain what was meant by it, and what word was made uſe of for the ſame operation in other parts of the country.

In anſwer to this requeſt, the following letter was received.

SIR,

SIR,

I RECEIVED your favour; and beg leave to acquaint you, that the uſe of my Machine is for opening and preparing the wool for the carders and ſpinners (which was formerly done by men beating it with ſticks called rods). But of late the method has been to uſe mills, called here *Gigging-Mills*, which in Yorkſhire are called *Towing-Mills*: theſe are worked by men turning them backward and forward, till the wool is ſufficiently opened for uſe. The reverſe motion, as ſhown in my Machine, was much wanted; and the benefit and advantage of it is well known, and approved; it having been at work almoſt two years.

I am

Your humble ſervant,

H. HUGHES.

Coggeſhall, March 25, 1789.

Mr. MORE.

IT is obvious that an eaſy and cheap method of Repairing Roads is of ſingular ſervice, in every part of the country; and the Harrow, of which a Plate is annexed, invented by Mr. HARRIOTT for that purpoſe, appearing, both from its form and from the Certificate, well calculated to anſwer that end, the Society voted a Bounty of TEN GUINEAS to the Inventor; and the Model is reſerved in the Repoſitory, for the inſpection and uſe of the Public.

SIR,

SIR,

SENSIBLE as I am of the great desire the Society for the Encouragement of Arts, Manufactures, and Commerce, have for encouraging every kind of improvement, if found really useful; I take the liberty of sending them the accompanying model of a Road-Harrow, which I directed to be made last summer; in hopes that it will meet the approbation of the Society of Arts, &c. and, through their means, become as generally useful to others, as I have experienced it to be to the roads in this parish.

Being appointed surveyor for the roads, at Michaelmas, 1786, and finding them very bad, I provided a sufficient quantity of stones and gravel against the next summer, to cover the roads pretty thick; but, when so done, I found the heavy loads of

chalk, gravel, and corn, ſoon turned the ſtones out, and made almoſt as deep a rut, or rake, as ever. Stubbing the quarter in, I found an endleſs job, as well as a great expence: I therefore contrived the Road-Harrow, of which this is a model, and by the help of which I have, during laſt ſummer, at a very trifling expence to the pariſh, (after the ruts were again filled up with ſtones) kept the roads in extraordinary good condition. A man, a boy, and two horſes, will do three miles in length in one day completely, harrowing down the quarters and drawing the ſtones together, which, by means of the mould-boards are dropped into the rut, far better than a man can ſtub them in: now if a man was employed to ſtub, he could not do it for leſs than a penny per rod (the moſt common price is three halfpence or two pence per rod, if they ſtub the outſide as well as the inſide quarter) which would amount to one pound ſix ſhillings and eight pence for one mile in length; conſequently, to four pounds for

three

three miles, which the road-harrow will do in one day; and for which I charged the pariſh, for man, boy, and horſes, only eight ſhillings.

It is not the difference in the expence only that conſtitutes its merit, for it does the work better as well as cheaper. In conſequence of the good effect on our roads, other pariſhes in this neighbourhood have made, and are making the ſame kind of harrows for their own roads: and I am inclined to think the uſe of them will ſoon become general, ſo far as known, wherever they mend their roads with gravel. Should this prove ſo by your approving and publiſhing the ſame, you may better conceive than I can relate the pleaſure I ſhall receive in hearing of the good effects.

The model which I have ſent is on a ſcale of two inches to a foot; by which you will find that the head of the harrow is three feet, from outſide to outſide of the

bars: the bars are four inches ſquare, and the length of them five feet. You will obſerve that the mould-boards extend eleven inches further; which I found neceſſary, in order to draw the ſtones (which the teeth of the harrow work up to the top) into a ſmaller focus, if I may ſo expreſs myſelf. Theſe mould-boards are four feet two inches long, ten inches deep, and two inches thick; they are ſhod with a bar of iron, and lined with an iron plate, ſo far as they are marked black on the model: the ſame holds good with every other part of the model, where it is marked black; being intended to diſtinguiſh the iron work from the wood work. The teeth (which ſhould be ſteeled at the points) are one foot in length, from the under ſide of the bars, to their points; they are one inch and a quarter ſquare; and are fixed with ſtrong nuts and ſcrews, with collars both on the under and upper ſide of the bars.

You

You will pleaſe to obſerve, I have made the bars go lengthways, inſtead of going acroſs: this I did to prevent them from ſplitting; which would have been difficult to have prevented, had the teeth been fixed in croſs-bars. As it is, I have found it anſwer the purpoſe intended, better than I expected: yet it is very likely it may be improved; I wiſh it may. Such as it is, I beg leave, through the medium of your Society, to preſent it to the public; for I do not like confining any thing (that may be of general uſe) by patents.

The harrow is drawn by two horſes abreaſt: a boy leads the outſide horſe, on the outer quarter; the other horſe goes in the horſe-path, the man ſteadying the harrow by the handles: of courſe they take one inſide and one outſide quarter as they go, and the other two quarters as they come back.

Should

Should the Honourable Society wiſh any further information, I ſhall be happy to communicate any thing in the power of

Your very humble ſervant,

JOHN HARRIOTT.

Great Stambridge,
Near Rochford, Eſſex.

Mr. MORE.

Great

WE whoſe names are hereunto ſubſcribed, do certify, That a certain machine, called a Road-Harrow, invented by John Harriott, Eſq. of Great Stambridge, in the county of Eſſex, for the purpoſe of harrowing down the quarters of the road, and gathering the ſtones into the ruts, was made, under his directions, for the uſe of the ſaid pariſh; and, from the experience of its very great utility to our roads this laſt ſummer and autumn, we are certain, that it does more work in one day, with a man, a boy, and two horſes, and in a much better manner, than could be effected by twenty men in the common mode of ſtubbing roads:

And we are of opinion, that if ſuch road-harrow was made generally known, it would be found of infinite uſe to all gravelled

velled roads, eſpecially where quarters are formed by carriages following in one continued t ack.

Z. STICHALL, Curate of Great Stambridge.
CHRISTOPHER WORSHIP, Churchwarden.
WILLIAM HARPER, Surveyor.
SAMUEL WOOLF,
ALBION DICKERSON, } Servants who worked
THOMAS MEAD, } the Harrow.

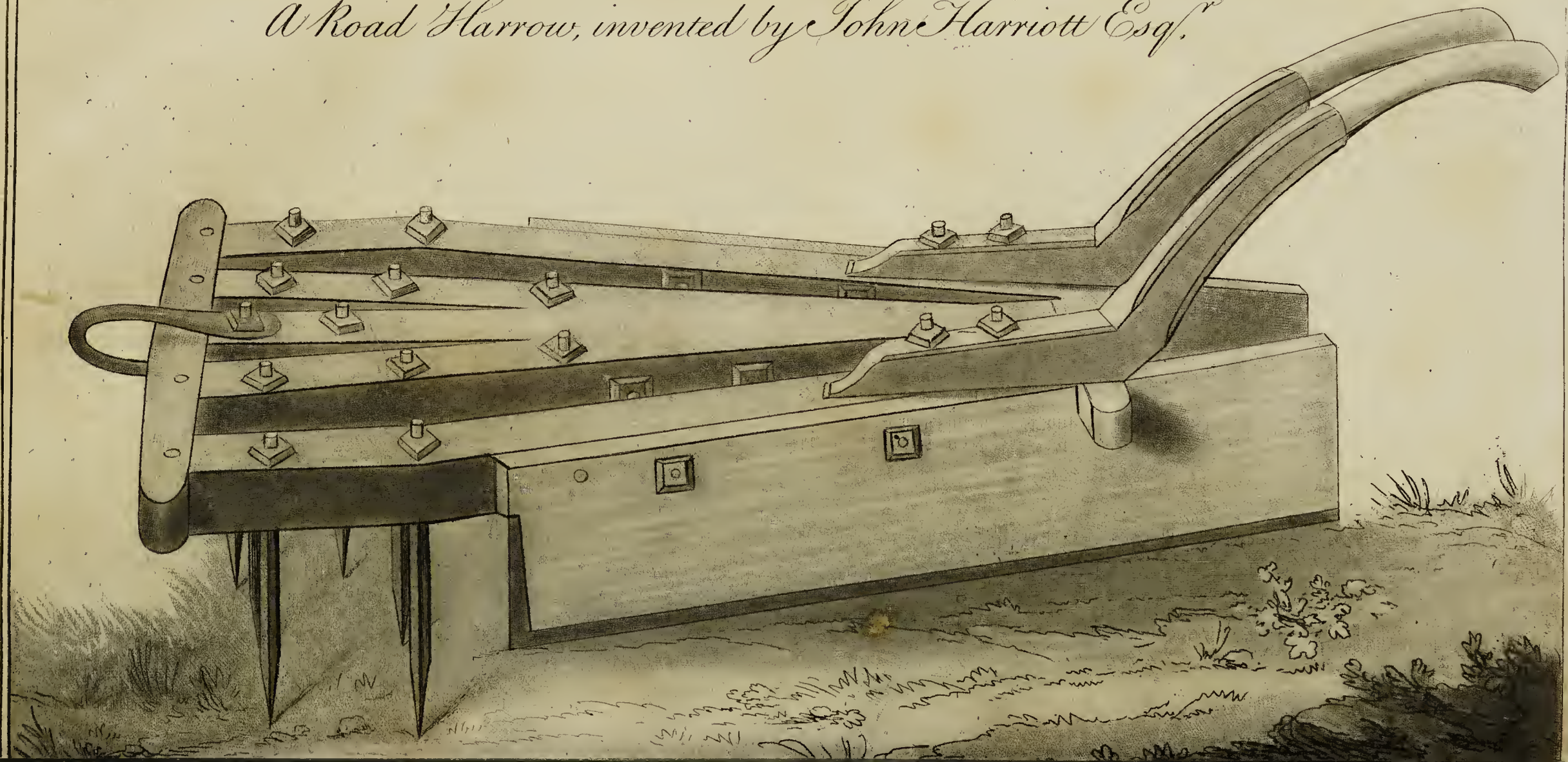
Great Stambridge,
Dec. 13, 1788.

A Print of Mr. Harriott's Road-Harrow is annexed; but the conſtruction being very ſimple, and the dimenſions of the ſeveral parts fully and accurately deſcribed in the foregoing Letter, a further explanation of the Plate is judged unneceſſary.

THE

Plate III.

A Road Harrow, invented by John Harriott Esq.r



THE following Papers, and annexed Plate, fully explaining a method of ſupplying the loſs of a Ship's Rudder at ſea, cannot fail of being highly acceptable to the public, when it is conſidered that ſuch an accident is attended with the moſt diſtreſſing circumſtance to all on board the veſſel: and as, from the letters of Capt. PAKENHAM and Capt. CORNWALLIS, it clearly appeared, the ſubſtitute hereafter deſcribed is fully adequate to the intention propoſed, the Society preſented their GOLD MEDAL to Capt. PAKENHAM, the inventor, as a mark of their approbation of his ingenious and uſeful contrivance of a Subſtitute for a Rudder, the complete model of which is reſerved in the Society's Repoſitory.

SIR,

SIR,

AS many of my profeſſion have honoured with their flattering teſtimony my machine for ſteering a ſhip when her Rudder is gone, I feel it a reſpect due to your Society, to preſent them with a model of it, accompanied with an explanation; perſuaded that the ſmalleſt effort to obtain a practical improvement cannot fail of being highly acceptable.

The Society will be pleaſed to obſerve, Sir, that this ſubſtitute for a rudder is formed of thoſe materials without which no ſhip goes to ſea, and its conſtruction ſimple and ſpeedy. If, from a conviction of its being calculated to anſwer the end propoſed, the Society ſhould be pleaſed to honour the contrivance with their approbation, it will add to the ſatisfaction I cannot but feel in having ſuggeſted an expedient,

expedient, under one of the moſt diſtreſſing ſituations a ſhip can poſſibly be reduced to.

I have the honour to be, with the greateſt reſpect,

SIR,

Your moſt faithful

and obedient ſervant,

EDWARD PAKENHAM.

Merlin, Portſmouth,
April 29, 1788.

Mr. MORE.

SIR,

SIR,

WHEN I was on the point of ſailing from England, I had the honour to ſend, for the inſpection of the Society, a Steering-Machine, to be uſed in circumſtances of diſtreſs, from the loſs of a Rudder: I forbore at that time entering into a particular account of it, as it has been often found that the moſt apparent and plauſible theory could not be reduced to practice; and I was determined to make the experiment, before I ſhould return to England again.

On the 7th of July laſt, in Trinity-Harbour, Newfoundland, the machine being prepared, and the Merlin's rudder unhung, the ſubſtitute was ſhipped with the greateſt eaſe, and the ſhip got under ſail: and it is now, Sir, with much ſatisfaction I can inform you, that, during the different manœuvres of tacking and wearing, we could

not diſcover the leaſt variation between the operation of the machine and that of the ſhip's proper rudder. She was ſteered, with the ſame eaſe, by one man; and anſwered the helm, in every ſituation, fully as quick.

It might probably be ſuppoſed, that a difficulty would occur in bringing the jaws of the cap to embrace the ſtern-poſt; but this will at once be obviated, when it is remembered that the top-chains, or hawſers, leading from each end of the jaws, under the ſhip's bottom, are, in fact, a continuance of the jaws themſelves. Nor can it be apprehended that the cap, when fixed, may be impelled from its ſtation, either by the efforts of the ſea, or the courſe of the ſhip through the water, though even the hawſers, which confine it in the firſt inſtance, ſhould be relaxed:—the experiment proves, that the partners muſt be firſt torn away, or the main-piece broken off.

Since the improved ſtate of navigation, notwithſtanding remedies have been found,

in general, for the moſt diſaſtrous accidents at ſea, experience has evinced that nothing complete had been hitherto invented to ſupply the loſs of a rudder. The firſt expedient within my knowledge, were cables veered aſtern, with tackles leading from them to the ſhip's quarters. This practice was ſuperſeded by the invention of the machine uſually called "the Ipſwich's Ma-" chine;" a drawing of which I have now the honour to incloſe. The deſcription will ſhew its complex and unwieldy conſtruction; and the great improbability of veſſels, in general, being found in poſſeſſion of the materials which form it. Commodore Byron, in the Journal of his Voyage round the World, ſays that the Tamer, with every aſſiſtance from his own ſhip, was five days in conſtructing it. Beſides, like the before-mentioned ſcheme, it can only operate to ſteer a ſhip large (and that but very wildly), and of courſe, under the circumſtance of a lee-ſhore, defeat the moſt ſkilful exertions of a ſeaman. Several other expedients

have

have been adopted, which I ſhall not mention here, as the ſame defects equally appear in all.

Thus it was apparent, that ample room was left for the diſcovery of ſome more certain reſource than any of the former; and the ſcheme which has ſuggeſted itſelf to me, will, I truſt, be found fully to anſwer the purpoſe intended.

The materials are ſuch as ſcarcely any ſhip can venture to ſea without; and the conſtruction ſo ſpeedy, eaſy, and ſimple, that the capacity of the meaneſt ſailor will at once conceive it.

I need not, from mathematical principles, ſhow the certainty of its effect, as it is formed and managed in the ſame manner as a ſhip's common rudder: and as the common rudder is certainly, of all inventions, the beſt calculated for guiding a veſſel through the water, it will of courſe follow, that, whatever ſubſtitute the neareſt

reſembles that, muſt be beſt adapted to ſupply its loſs.

I wiſh not, Sir, from the completion of a ſimple invention, to arrogate to myſelf ſuperior merit in a profeſſion which can happily boaſt ſo many great and able officers; nevertheleſs it becomes the duty of every ſea commander to anticipate, and provide a remedy for any poſſible diſaſter that may befall him: and I look for no greater reward in the performance of my duty, than the conſciouſneſs of having at leaſt endeavoured to be uſeful to ſociety, and the approbation of my profeſſion.

I have the honour to be, with great reſpect and conſideration,

SIR,

Your moſt obedient
humble ſervant,

EDWARD PAKENHAM.

Merlin, Spithead,
January 15, 1789.

Mr. MORE.

SIR,

SIR,

I AM this moment favoured with your obliging letter; and it affords me a particular pleaſure in informing you I have juſt received the moſt convincing proof of the certainty of the ſucceſs of my ſubſtitute for a rudder, by a trial it has lately had, on board his Majeſty's ſhip Crown, of ſixty-four guns, which, in paſſing from the eaſtward, loſt her rudder on the Kentiſh Knock, and was ſteered to Portſmouth with the ſubſtitute, notwithſtanding it blew a gale of wind moſt of the time: and Capt. Cornwallis (who commanded her) informs me it would have taken her to the Eaſt-Indies with eaſe.

The polite attention you have ſhown to the ſucceſs of the ſubſtitute, impreſſes me

with much eſteem: and I beg you will accept, with kindneſs, the aſſurance of my being, with reſpect,

DEAR SIR,

Your moſt faithful

and obliged ſervant,

EDWARD PAKENHAM.

Crutched-Friars,
Feb. 1. 1789.

Mr. MORE.

SIR,

SIR,

CAPTAIN Pakenham having incloſed me a letter from you, wherein you are deſirous of having a Certificate from me, reſpecting the utility of his temporary rudder; and which would likewiſe be of eſſential ſervice to Capt. Pakenham;

I do therefore certify, That, on our getting on ſhore, in his Majeſty's ſhip the Crown, under my command, our rudder was unſhipped, and rendered totally uſeleſs, by having all the pintles broke ſhort off; and, on our arrival in the Downs, we got the rudder up along-ſide the ſhip: and having the plan of Capt. Pakenham's ſubſtitute for a rudder on board, I ordered the ſpare cap to be fitted exactly ſimilar to the plan; which when done, we hung it, with great eaſe, and hove it cloſe to the ſternpoſt, by the top chains and hawſers, fixed to the

eye-bolts of the cap, and brought in forward. We found it anſwer extremely well: it had a very fair trial; for we were two days beating to windward, under cloſe-reefed topſails, and ſometimes a heavy ſea: and I have not the leaſt doubt, had we loſt our rudder, and had been obliged to have made uſe of Capt. Pakenham's, it would have anſwered in every reſpect: and it is not only my own opinion, but likewiſe the opinion of all my officers, that it would conduct a ſhip to any part of the world. We made uſe of all the materials deſcribed in the plan. I therefore think there cannot be a doubt of the great utility of it.

I am, SIR,

Your moſt obedient

humble ſervant,

JAMES CORNWALLIS.

His Majeſty's Ship Crown,
February 9, 1789.

Mr. MORE.

EXPLANATION

EXPLANATION *of the Plate of a* SUBSTITUTE *for a* RUDDER, *invented by Capt.* EDWARD PAKENHAM, *formed from thoſe materials without which no ſhip goes to ſea.*

No. 1. A topmaſt inverted; the fid-hole to ſhip the tiller in, and ſecured with hoops from the anchor ſtocks; the heel forming the head of the rudder.

2. The inner half of a jibb-boom.

3. The outer half of a jibb-boom.

4. A fiſh: the whole of theſe materials well bolted together:—in a merchantman her ruff-tree.

5. A cap, with the ſquare part cut out to fit the ſtern-poſt, and acting as a lower gudgeon, ſecured to the ſtern-poſt with hawſers,

ſers, leading from the bolts of the cap, under the ſhip's bottom, into the hawſe holes, and hove well tort.

6. A plank, or, if none on board the ſhips, gangboards.

7. Anchor-ſtocks, made to fit the topmaſt as partners, ſecured to the deck, and ſupplying the place of the upper gudgeon; and in a merchant-ſhip the clamps of her windles.

8. A ſtern-poſt.

9. Hoops from the anchor-ſtocks.

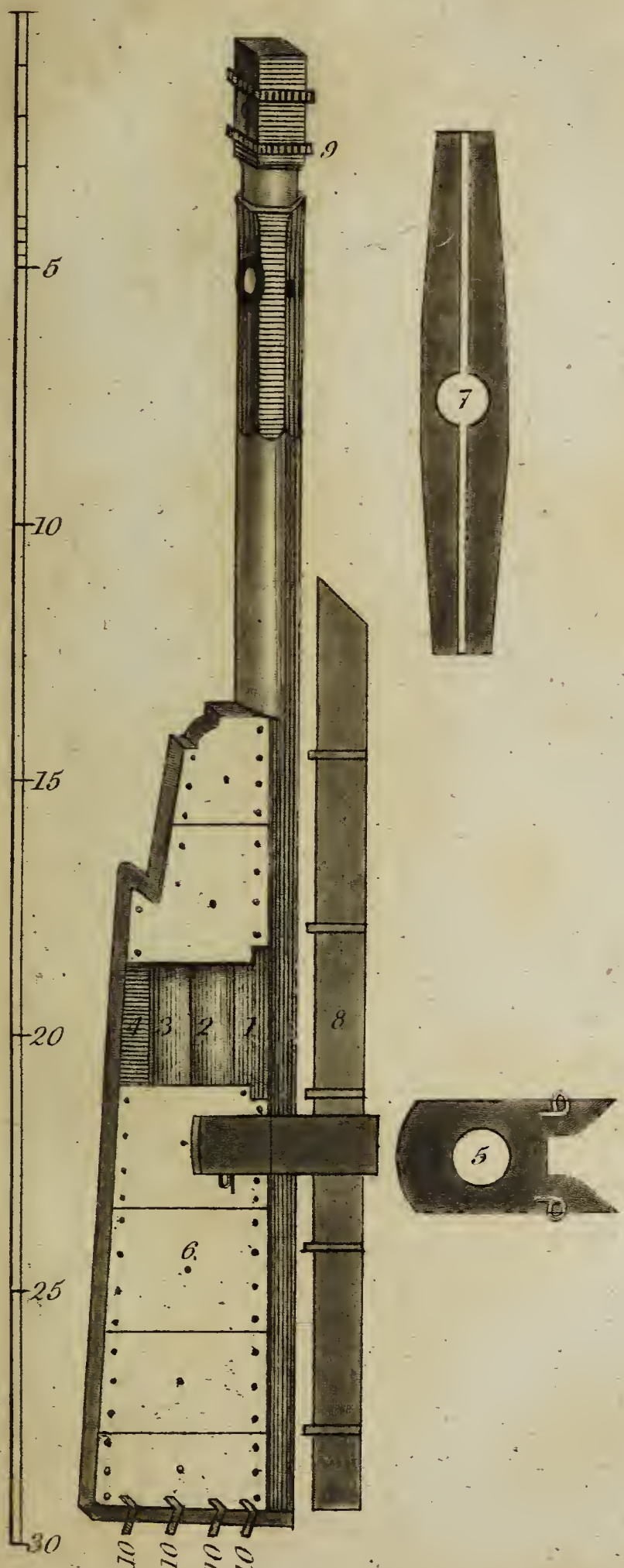
10. Pigs of ballaſt, to ſink the lower part.

The head of the rudder to paſs through as many decks as you wiſh.

Plate IV.

Substitute for a Rudder.

by Captain Edward Pakenham.



PAPER

IN

COLONIES AND TRADE.

IN the fourth Volume of theſe Tranſactions, a Letter from Mr. George Wilſon, on the introduction of the Cinnamon-tree into the Iſland of Jamaica, is inſerted: the following account, from the ſame Gentleman, confirming the thriving ſtate of that valuable plant in that Iſland, cannot fail of proving highly ſatisfactory. The ſpecimens produced to the Society having fully ſhown the tree to be of the true kind, and in a very promiſing ſtate; the Thanks of the Society were voted to Mr. WILSON, for this very ſatisfactory and intereſting communication.

SIR,

SIR,

IN the year 1785, I had the honour, through your kindneſs, to preſent to the Society a leaf of the *Laurus Cinnamomi*, the product of Jamaica: I have now the happineſs to tranſmit to you a ſpecimen of the bark, which, conſidering that it was taken from a very young tree, eminently poſſeſſes the true flavour of the Cinnamon; and may encourage us to expect that, in a few years, we ſhall be able, from our own Iſlands, to rival the Dutch in the ſale of that very elegant and valuable ſpice.

I have likewiſe ſent, for your inſpection, a ſpecimen of the flowers and fruit, in ſpirits; and a dried ſprig of the tree itſelf, with the bloſſoms upon it: theſe prove inconteſtably the thriving ſtate of the plant,

and

and its propagation: and my friend, Dr. Dancer, who ſent them to me, and is Superintendant of the Botanic Garden in that Iſland, aſſures me that it has equalled his warmeſt expectations.

I beg to notice to you, that, although the bark is poſſeſſed, in a very high degree, of the true cinnamon flavour, the leaves have a mixed flavour of the clove and the cinnamon; in which the firſt unqueſtionably predominates: and a ſimple water, which I diſtilled from the leaves, is very highly impregnated with the ſame clove flavour; in proof of which I have ſent you a ſample of it.

I have alſo the pleaſure to tell you, that the ſame Gentleman informs me, there will be an immenſe crop of mangoes this year; and that the mangoſteen thrives very well, but has hitherto borne only male flowers.

If you think this information worth the attention of the Society, in communicating it you will oblige

Yours, moſt reſpectfully,

G. WILSON.

Henrietta-Street,
Auguſt 13, 1788.

Mr. MORE.

P.S. I have incloſed a ſlight drawing of the ſpecimen of the flowers and fruit, which are preſerved in ſpirits.

This Drawing is reſerved in the Collection of the Society, for the inſpection of the Public.

REWARDS

REWARDS

ADJUDGED BY THE

SOCIETY

IN

M.DCC.LXXXVIII.

REWARDS

ADJUDGED IN

AGRICULTURE.

TO the Right Honourable the EARL of FIFE, for Plantations of various kinds of trees, in Scotland, the GOLD MEDAL. See the Account, Vol. VI. page 3.

To Mr. JOHN ROSS, Profeſſor of Oriental Languages, in King's College, Aberdeen, for introducing the culture of the Turnep-rooted Cabbage, and for his account of the ſucceſs attending it in the northern parts of the Iſland of Great-Britain, the SILVER MEDAL. See Vol. VI. page 66.

To Thomas Eccleston, Eſq; of Scariſbrick, Lancaſhire, for his improvement of Martin-Meer; by which three thouſand ſix hundred and thirty-two acres of land have been gained, and protected from the inundation of the ſea; the Gold Medal. See page 50.

To the Rev. Dr. Hinton, of Northwold, near Brandon, Suffolk, for his attention to the culture of the Chineſe Hemp, the Silver Medal. See Vol. VI. page 104.

Claſs 63. To Mr. John Boote, of Atherſtone upon Stour, Warwickſhire, for an account of the comparative culture of Wheat, the Gold Medal. See Vol. VI. page 73.

To

Claſs 110. To the Rev. HENRY BATE DUDLEY, of Bradwell juxta Mare, Eſſex, for gaining Land from the Sea, the GOLD MEDAL. See the Papers, Vol. VI. page 56.

Claſs 30. To the Right Reverend RICHARD Lord Biſhop of LANDAFF, for having planted forty-eight thouſand five hundred Larches, at Wansfell, near Ambleſide, Weſtmoreland, the GOLD MEDAL. See page 3.

Claſs 49. To JOHN SNEYD, Eſq. of Belmont, Staffordſhire, for having planted one hundred and thirty-two thouſand two hundred and twelve Timber-trees, the GOLD MEDAL. See page 6.

POLITE AND LIBERAL ARTS.

To Mr. ROBERT MULLER, St. James's Palace, for a Drawing, after a picture painted by Mr. Weſt, the SILVER MEDAL. Subject, David King of Scotland reſcued from the fury of a Stag.

Claſs 138. To Miſs CHARLOTTE CROPLEY, Carnaby-ſtreet, for a Drawing, the GOLD MEDAL. Subject, VENUS DE MEDICIS.

Claſs 139. To Miſs MARGARET ELIZA CUNLIFFE, New Norfolk-ſtreet, for a Drawing, the SILVER MEDAL. Subject, THE HOLY FAMILY.

To

To Mr. ROBERT BROMLEY, at Charles Anderſon Pelham's, Eſq. Arlington-ſtreet, for his Pocket Memorandum Book, for the uſe of Blind Perſons, the SILVER MEDAL. See page 105.

MANUFACTURES.

Claſs 169. To Mr. THOMAS GREAVES, of Millbank, near Warrington, Lancaſhire, for Manufacturing Paper from Raw Vegetables, the SILVER MEDAL. See Vol. VI. page 159.

To Miſs ANN IVES, of Spalding, Lincolnſhire, for Fine-ſpinning Wool, the SILVER MEDAL. See page 150.

To Mr. JOHN DAVIS, of Salisbury-Court, Fleet-Street, for his Improvement of Marbled Paper, the SILVER MEDAL. See page 117.

MECHANICKS.

To Mr. JOSEPH RIDLEY, of Jerusalem-Court, St. John's Street, for his Improvement of the Sector and Depthening Tool, for Wheels and Pinions of Watches, TWENTY GUINEAS. See Vol. VI. page 187.

PRESENTS

PRESENTS

RECEIVED BY THE

SOCIETY

In the YEAR M.DCC.LXXXVIII.

With the Names of the DONORS.

BOOKS.

Reverend THOMAS MARTYN.

A Manuſcript Index of the Names, in Engliſh, of thoſe Plants mentioned in Monſ. D'Ambourney's Treatiſe, entitled "Recueil de Procédés & d'Expériences ſur les Teintures Solides."

VALENTINE

VALENTINE GREEN, Esq.

Two Numbers of a Work entitled Acta Historica Reginarum Angliæ.

ROYAL SOCIETY.

Philosophical Transactions of the Royal Society of London, Vol. LXXIII. for the year 1788, Part I.

AMERICAN ACADEMY.

Memoirs of the American Academy of Arts and Sciences, Vol. I.

Mr. SAMUEL HOOPER.

Academy for Grown Horsemen.

Manœuverer, or Skilful Seaman, translated from the French of M. Bourdé de Villehuet, by the Chevalier de Sausseuil.

An Essay on Signals.

Rules for drawing Caricatures, with an Essay on Comic Painting.

Military Antiquities, 2 Vols. by Francis Grose, Esq.

LE CHEVALIER DE SAUSEUIL.

Anatomie de la Langue Françoiſe, by Le Chev. de Sauſeuil.

Lettres de l'Auteur de la Langue Françoiſe.

Mr. JOHN HYACINTH DE MAGELLAN.

Cronſtedt's Mineralogy improved, by M. De Magellan, 2 Vols.

GEORGE EDWARDS, Eſq.

The Aggrandiſement and National Perfection of Great-Britain, 2 Vols. by George Edwards, Eſq. M.D.

THE BATH SOCIETY.

The Fourth Volume, entitled Letters and Papers on Agriculture, Planting, &c. of the Society inſtituted at Bath for the Encouragement of Arts, &c.

The Rules and Orders of the Society inſtituted at Bath for the Encouragement of Arts, &c.

Sir

Sir HERBERT MACKWORTH, Bart.

Three Volumes of the New Memoirs of the Bern Society.

B. COPPENS, M.D.

Mémoire ſur la queſtion ſuivante, Indiquer les nouvelles Branches de Manufactures & de Commerce qui pourroient être introduites dans les diverſes Provinces des Pays-Bas Autrichiens, by Dr. Coppens.

G. I. THORKELIN, L.L.D.

Fragments of Engliſh and Iriſh Hiſtory in the Ninth and Tenth Centuries, by Dr. Thorkelin.

MISCELLANEOUS MATTERS.

MR. DAVIS.

Several Samples of Marbled Paper.

A CATA-

A CATALOGUE

OF THE

MODELS AND MACHINES

Received ſince the Publication of the Sixth Volume of the Society's Tranſactions, with the Numbers, as they are arranged in the Claſs to which they belong.

AGRICULTURE. CLASS I.

LXXVIII. A Model of a Bruſh-Harrow, preſented by Thomas Hooton, of Newport-Pagnel, Bucks.

MANU-

MANUFACTURES. CLASS III.

XXVI. An Apparatus for breeding Silk-worms, prefented to the Society by the Rev. George Swayne; for which, and his Account of Silk-worms, the Society gave Mr. Swayne their Silver Medal. See page 120.

XXVII. A Model of an improved Loom for weaving Modes, for which Mr. Samuel Sholl, received a Bounty of Thirty Guineas, and the Silver Medal.

An account of this Loom will be given in fome future Volume.

MECHANICKS. CLASS IV.

CXIII. A Model of a Machine for Twitching Wool, by Mr. Hugh Hughes, of Coggefhall, in Eſſex, for which a Bounty of Twelve Guineas was adjudged to him. See page 187.

A Model

CXIV. A Model of a Subſtitute for a Rudder, by Capt. Edward Pakenham, for which the Society preſented him their Gold Medal. See page 205.

CXV. A Model of a Road-Harrow, by Mr. Harriott, for which a Bounty of Ten Guineas was adjudged to him. See page 196.

CXVI. A Model of an improved Jack for raiſing Weights, for which a Bounty of Twenty Guineas was given to Mr. Mocock.

An account of this Jack will be given in ſome future Volume.

CXVII. A new-invented Laſt for ſtretching of Shoes, preſented by Mr. Kelman.

MISCELLANEOUS MATTERS.

The Tuſcan Arch, deſigned to prevent Children being overlaid, preſented to the Society by Count Berchtold.

A LIST

A LIST

OF THE

OFFICERS of the SOCIETY,

AND

CHAIRMEN

OF THE SEVERAL

COMMITTEES.

PRESIDENT.

ROBERT Lord Romney, LL. D. F. R. S.

VICE-PRESIDENTS.

Charles Duke of Richmond, K. G. F. R. S.
Hugh Duke of Northumberland, K. G. F. R. S.

R George

George Duke of Montague, K. G. F.R.S.
Jacob P. Earl of Radnor.
George Auguſtus Lord Heathfield, K.B.
Honourable Charles Marſham, F. R. S.
Edward Hooper, Eſq. F. R. S.
Owen Saluſbury Brereton, Eſq. F. R. and A. S.
Sir Herbert Mackworth, Bart. F. R. S.
James Daviſon, Eſq.
Sir William Dolben, Bart.
Sir Watkin Lewes, Knt.

SECRETARY.

Mr. Samuel More.

ASSISTANT-SECRETARY.

Mr. John Samuel.

REGISTER and TEMPORARY COLLECTOR.

Mr. George Cockings.

CHAIRMEN

CHAIRMEN OF THE SEVERAL COMMITTEES.

Elected March 23, 1789.

ACCOMPTS.

James Hebert, Eſq.
Francis Stephens, Eſq. F. A. S.

CORRESPONDENCE AND PAPERS.

Valentine Green, Eſq. F. A. S.
Robert Dower, Eſq.

POLITE ARTS.

C. Whitefoord, Eſq. F. R. S.
John Pariſh, Eſq. F. A. S.

AGRICULTURE.

John Pratt, Eſq.
Rev. James Cooke.

MANUFACTURES.

Mr. C. Smith,
Mr. Baynes.

MECHANICKS.

Joſeph Hurlock, Eſq. F. R. S.
Samuel Ewer, Eſq.

CHEMISTRY.

Sir John Ingilby, Bart.
Mr. Kendrick.

COLONIES AND TRADE.

Mr. Joſeph Pourcin,
John Baker, Eſq.

MISCELLANEOUS MATTERS.

Mr. Jacob,
Mr. A. Hall.

PREMIUMS

OFFERED BY THE

SOCIETY

FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES

AND

COMMERCE,

IN THE YEAR

M.DCC.LXXXIX.

TO THE

PUBLIC.

ADELPHI-BUILDINGS,
April 8, 1789.

THE chief objects of the attention of the Society for the Encouragement of Arts, Manufactures, and Commerce, in the application of their Rewards, are Ingenuity in the ſeveral branches of the POLITE and LIBERAL ARTS, uſeful Diſcoveries and Improvements in AGRICULTURE, MANUFACTURES, MECHANICKS, and CHEMISTRY, or the laying open any ſuch to the Public; and in general, all ſuch uſeful Inventions, Diſcoveries, or Improvements (though not mentioned in the Book of Premiums) as may appear to have a tendency to the advantage of Trade and Commerce. The Society therefore, in purſuance of their plan, propoſe to beſtow the following Premiums.

Premiums for Planting and Huſbandry.

1. ACORNS. For having ſet, agreeably to the conditions publiſhed in the liſt of premiums laſt year, between the firſt of October, 1788, and the firſt of April, 1789, the greateſt quantity of ſtrong land, not leſs than ten acres, with Acorns, and ſeeds or cuttings of other trees, and for the effectually fencing and preſerving the ſame, in order to raiſe timber and underwood; the gold medal.

2. For the ſecond greateſt quantity of land, not leſs than five acres, ſown or ſet agreeably to the above conditions, the ſilver medal.

CERTIFICATES of ſetting or ſowing agreeably to the above conditions, and that there are not fewer than three hundred young Oaks on each acre, to be delivered to the Society on or before the firſt Tueſday in November, 1789.

3, 4.

3, 4. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1790.

5, 6. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November 1791.

7, 8. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1792.

9. RAISING OAKS. To the perſon who ſhall have raiſed the greateſt number of Oaks, not fewer than five thouſand, either from young plants, or from acorns, in woods, parks, or foreſts, that have long been under timber, and effectually fenced and preſerved the ſame, in order to ſecure a ſucceſſion of oak timber in this kingdom; the gold medal.

10. For the next greateſt quantity, not fewer than three thouſand, the ſilver medal.

CERTIFICATES and Accounts to be produced on or before the firſt Tueſday in January, 1790.

11, 12. The ſame premiums are extended one year further.

CERTIFICATES that there were on the land, upon the firſt of November, 1790, at leaſt the number of young Oak-trees required, in a thriving condition, effectually fenced and preſerved, with an account of the methods purſued in making and managing the plantation, to be produced to the Society on or before the firſt Tueſday in January, 1791.

13, 14. The ſame premiums are extended one year further. Certificates to be produced on or before the firſt Tueſday in January, 1792.

15. OBSERVATIONS ON OAK. To the perſon who ſhall furniſh the beſt obſervations and experiments on the various obſtructions

obſtructions to the growth of Oak trees, with appoſite remedies for the ſame; and ſhall alſo aſcertain thoſe appearances on Oak trees, which may ſerve to ſhow them to have arrived at the proper period, and to be in a fit ſtate to be felled, for the purpoſes of ſhip-building, and other uſes; the gold medal, or twenty guineas.

The accounts to be produced to the Society on or before the third Tueſday in December, 1789.

16. The ſame premium is extended one year further. The accounts to be produced on or before the third Tueſday in December, 1790.

17. CHESNUTS. For having ſown or ſet, agreeably to the conditions publiſhed in the liſt of premiums laſt year, between the firſt of October, 1788, and the firſt of April, 1789, the greateſt quantity of dry loamy land, not leſs than ſix acres, with a mixture of Spaniſh Cheſnuts, and the ſeeds or cuttings of other trees adapted to ſuch

ſoil, and for effectually fencing and preſerving the ſame, in order to raiſe timber; the gold medal.

18. For the ſecond greateſt quantity, not leſs than four acres, the ſilver medal.

CERTIFICATES of ſowing or ſetting agreeably to the above conditions, and that there are not fewer than three hundred Cheſnut plants, in a thriving ſtate, on each acre, to be delivered to the Society on or before the firſt Tueſday in November, 1789.

19, 20. The ſame premiums are extended one year further,

CERTIFICATES to be delivered on or before the firſt Tueſday in November, 1790.

21, 22. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the firſt Tueſday in November, 1791.

23, 24. The ſame premiums are extended one year further.

CERTI-

CERTIFICATES to be delivered on or before the firſt Tueſday in November 1792.

25. ELM. For having planted the greateſt number of the Engliſh Elm, not leſs than eight thouſand, between the twenty-fourth of June, 1788, and the twenty-fourth of June, 1789, and for the having effectually fenced and preſerved the ſame, in order to raiſe timber; the gold medal.

26. For the ſecond greateſt number, not leſs than five thouſand, the ſilver medal.

27. For the third greateſt number, not leſs than four thouſand, the ſilver medal.

CERTIFICATES of the having planted, agreeably to the above conditions, and ſpecifying the diſtance of the trees, muſt be delivered to the Society, on or before the firſt Tueſday in November, 1789.

28, 29, 30. The ſame premiums are extended one year further.

CERTI-

CERTIFICATES of the having planted agreeably to the above conditions, that the plants were in a healthy and thriving ſtate two years at leaſt after making the plantation, and ſpecifying the diſtance of the plants, to be delivered to the Society on or before the firſt Tueſday in November, 1792.

31, 32, 33. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1793.

34. LARCH. For having planted out, from the twenty-fourth of June, 1788, to the twenty-fourth of June, 1789, at a diſtance not more than five feet, the greateſt number of Larch-trees, not leſs than five thouſand; the plants to be between two and four years old when planted out; and for having effectually fenced and preſerved the ſame, in order to raiſe timber; the gold medal.

35.

35. For the ſecond greateſt number, not leſs than three thouſand, the ſilver medal.

CERTIFICATES of having planted agreeably to the above conditions, to be delivered on or before the laſt Tueſday in November, 1789.

36. LARCH. For having planted out, between the twenty-fourth of June, 1789, and the twenty-fourth of June, 1790, in a mixed plantation of foreſt-trees, the greateſt number of Larch-trees, not fewer than five thouſand, and for having effectually fenced and preſerved the ſame, in order to raiſe timber; the gold medal.

37. For the next greateſt number, not fewer than three thouſand, the ſilver medal.

CERTIFICATES of the number of plants, that they were in a healthy and thriving ſtate two years at leaſt after they were planted out, with a general account of the methods uſed in making the plantation, to be delivered to the Society on or before the laſt Tueſday in December, 1793.

38.

38, 39. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1794.

40. SILVER FIR. For having planted out, between the twenty-fourth of June, 1789, and the twenty-fourth of June, 1790, in a mixed plantation of foreſt-trees, the greateſt number of Silver Firs, not fewer than two thouſand; and for having effectually fenced and preſerved the ſame, in order to raiſe timber; the gold medal.

41. For the next greateſt number, not fewer than one thouſand, the ſilver medal.

CERTIFICATES of the number of plants, that they were in a healthy and thriving ſtate two years at leaſt after they were planted out, with a general account of the methods uſed in making the plantation, to be delivered to the Society on or before the laſt Tueſday in December, 1793.

42, 43. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1794.

44. HUNTINGDON WILLOW. For the greateſt number of acres, not leſs than three, planted in the year 1788, with Huntingdon Willows; the number of cuttings to be at leaſt one thouſand on each acre, properly fenced and ſecured; the gold medal.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1789.

45. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in December, 1790.

46. UPLAND OR RED WILLOW. For the greateſt number of acres, not leſs than three, planted before the end of April, 1788, with Upland or Red Willow, properly fenced and ſecured, the number of plants on each acre to be at leaſt twelve hundred, the gold medal.

CERTIFICATES of the number of plants, and that they were in a thriving ſtate at the time of ſigning ſuch certificates, to be produced to the Society on or before the laſt Tueſday in April, 1790.

47. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in April, 1791.

It is well known that this ſpecies of willow thrives well on dry ſandy land.

48. ALDER. For the greateſt number of acres, not leſs than ſix, planted in the year 1788 with Alders, to be at leaſt one thouſand on each acre, properly fenced and ſecured; the gold medal.

CERTIFICATES to be produced to the Society on or before the laſt Tueſday in December, 1789, of the ſaid planting, and that the trees were then growing on the land.

49. ALDER. For having planted in the year 1789 the greateſt number of Alders, not leſs than three thouſand on an eſtate, the property of one perſon; the gold medal.

CERTIFICATES of the number of the plants, and that they were in a thriving ſtate two years at leaſt after being planted, to be delivered to the Society on or before the laſt Tueſday in December, 1792.

50. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1793.

51. ASH. For having ſown or ſet in the year 1788, the greateſt quantity of land, not leſs than ſix acres, with Aſh for timber, intermixed with the ſeeds, cuttings, or plants of ſuch other trees as are adapted to the ſoil; the gold medal.

52. For the next greateſt quantity, not leſs than four acres, the ſilver medal.

CERTIFICATES of the ſowing or ſetting agreeably to the above conditions, and that there are not fewer than one hundred Aſh plants on each acre, to be delivered to the Society on or before the laſt Tueſday in December, 1789.

53, 54. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1790.

55. ASH. For having ſown or ſet in the year 1790, the greateſt quantity of land, not leſs than ſix acres, with Aſh for timber, intermixed with ſeeds, cuttings, or plants of ſuch other trees as are adapted to the ſoil; the gold medal.

56. For the next greateſt quantity, not leſs than four acres, the ſilver medal.

CERTIFICATES of the ſowing or ſetting agreeably to the above conditions, that there are not fewer than one hundred Aſh plants on each acre, in a thriving and healthy

healthy condition, two years at leaſt after the ſowing or ſetting, with a general account of the methods uſed in making the plantation, to be delivered to the Society on or before the laſt Tueſday in December, 1793.

57, 58. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in December, 1794.

59. MIXED TIMBER TREES. To the perſon who ſhall have incloſed, planted, or ſown the greateſt number of acres, not leſs than ten, with the beſt ſorts of Foreſt trees, for timber, between the firſt of October, 1785, and the firſt of May, 1787; the gold medal.

An Account of the methods uſed in making the plantations, and of the nature of the ſoil, together with proper Certificates that the trees were in a thriving and healthy ſtate two years at leaſt after

making the plantation, to be delivered to the Society on or before the firſt Tueſday in November, 1789.

60. The ſame premium is extended one year further.

The Accounts and Certificates to be delivered to the Society on or before the firſt Tueſday in November, 1790.

61. The ſame premium is extended one year further.

The Accounts and Certificates to be delivered to the Society on or before the firſt Tueſday in November, 1791.

62. The ſame premium is extended one year further.

The Accounts and Certificates to be delivered to the Society on or before the firſt Tueſday in November 1792.

63. MULBERRY CUTTINGS OR TREES. For having planted the greateſt number of White or Black Mulberry Cuttings

tings or Trees, not fewer than three hundred, in the year 1787, for the purpoſe of feeding Silk-worms; the gold medal, or twenty pounds.

64. For the ſecond greateſt quantity, not fewer than one hundred and fifty, the ſilver medal, or ten pounds.

CERTIFICATES of ſuch planting, with the manner of culture, and that the trees were growing in the month of July, 1789, to be produced to the Society on or before the firſt Tueſday in November, 1789.

65, 66. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1790.

67, 68. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1791.

69. MULBERRY TREES IN HEDGE ROWS. To the perſon who ſhall plant, in the year 1788, the greateſt number, not fewer than one hundred layers, of the Black or White Mulberry, in Hedge Rows, at a diſtance not leſs than twelve feet from each other, ten pounds.

70. For the next greateſt number not leſs than fifty, five pounds.

CERTIFICATES of the number of plants, and that the trees were then in a growing ſtate, to be produced to the Society on or before the firſt Tueſday in October, 1789.

71, 72. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1790.

*** *The Candidates for planting all kinds of Trees are to certify, that the reſpective Plantations are properly fenced and ſecured, and particularly to ſtate the Condition the Plants*

Plants were in at the time of ſigning ſuch Certificates.

Any information which the Candidates for the foregoing Premiums may chooſe to communicate, relative to the methods made uſe of in forming the Plantation, or promoting the growth of the ſeveral Trees, or any other obſervations that may have occurred on the ſubject, will be thankfully received.

73. TREES FOR USE WHEN EXPOSED TO THE WEATHER. To the perſon who ſhall ſend the moſt ſatisfactory account, verified by experiments, to determine which of the following trees is of the greateſt utility for timber or poles, for uſe, when expoſed to the weather; viz.

Larch,	Black Poplar,
Aſh,	Spaniſh Cheſnut,
Willow,	Alder,
Beech,	Silver Fir;
Lombardy Poplar,	

the gold medal.

The

The Accounts to be produced on or before the ſecond Tueſday in December, 1789.

74. The ſame premium is extended one year further.

The Accounts to be produced on or before the ſecond Tueſday in December, 1790.

75. PLANTING BOGGY OR MORASSY SOILS. For an account of the beſt ſet of experiments ſent by the planter or his repreſentative, to aſcertain the comparative advantages of planting boggy or moraſſy ſoils with White Poplar, Black Poplar, Lombardy Poplar, and Willow; the gold medal, or twenty guineas.

It is required that not leſs than half an acre be planted with each, and the plants to be not more than four feet aſunder.

It is alſo required that the plantation ſtand fourteen years, at the end of which

to

to be all cut down and measured, or accurately measured standing; the Certificates of the measure and value, and that the whole is properly fenced and secured, to be produced on or before the first Tuesday in January, 1792.

N. B. Any information relating to the state of the plantation, if sent to the Society between the time of planting, and claiming the premium, will be thankfully received.

76. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1793.

77. The same premium is extended one year further.

CERTIFICATES to be produced on or before the first Tuesday in January, 1794.

78. The same premium is extended to the year 1796.

CERTI-

CERTIFICATES to be produced on or before the firſt Tueſday in January, 1797.

79. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in January, 1798.

80. COMPARATIVE CULTURE OF WHEAT. For the beſt ſet of experiments made on not leſs than eight acres, four of which to be ſown broad-caſt and four drilled, to aſcertain whether it is moſt advantageous to cultivate Wheat by ſowing it in the common broad-caſt way, or by drilling it in equi-diſtant rows, hoeing the intervals; the gold medal, or the ſilver medal and twenty guineas.

It is required that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the corn, be produced to the Society on or before the firſt Tueſday in February, 1790.

81.

81. The ſame premium is extended one year further.

The Accounts to be produced to the Society on or before the firſt Tueſday in February, 1791.

82. COMPARATIVE CULTURE OF WHEAT. For the beſt ſet of experiments made on not leſs than eight acres of land, four of which to be ſown broad-caſt and four dibbled, to aſcertain whether it is moſt advantageous to cultivate Wheat by ſowing it in the common broad-caſt way, or by dibbling it in equidiſtant rows, hoeing the intervals; the gold medal, or the ſilver medal and twenty guineas.

It is required that an account of the nature and condition of the land on which the experiments are made, together with an account of the produce of the corn, be produced to the Society on or before the firſt Tueſday in February, 1790.

83. The ſame premium is extended one year further. The Accounts to be produced to the Society on or before the firſt Tueſday in February, 1791.

84. BEANS AND WHEAT. To the perſon who ſhall have planted or drilled, between the firſt of September, 1787, and the firſt of March, 1788, the greateſt quantity of land, not leſs than ten acres, with Beans, and ſhall ſow the ſame land with Wheat in the ſame year, 1788; twenty guineas.

It is required that an account of the ſort and quantity of Beans, the time of planting or drilling, and of reaping or mowing them, the produce per acre threſhed, the application of the ſtraw, the expence of planting or drilling, hand or horſe-hoeing, the diſtance of the rows, and the quality of the ſoil, together with Certificates of the number of acres, and that the land was actually ſown with Wheat in the year 1788, to be produced

produced on or before the firſt Tueſday in November, 1789.

N. B. the Society have been informed that Beans may be drilled or planted ſo early as the month of December, from whence may be derived the advantage of an early harveſt; in which caſe the ſtraw will be far more valuable than that from a later planting or drilling.

85. The ſame premium is extended one year further. The Accounts to be produced on or before the firſt Tueſday in November, 1790.

86. TURNEPS. For the beſt account of experiments made on at leaſt ſix acres of land, to determine the comparative advantage of the drill or broad-caſt method in the cultivation of Turneps; the gold medal, or the ſilver medal and ten guineas.

The Accounts to be delivered in, on or before the third Tueſday in April, 1790.

87.

87. The ſame premium is extended one year further.

The Accounts to be delivered on or before the third Tueſday in April, 1791.

88. GREEN VEGETABLE FOOD. For the beſt account, confirmed by experiments, of the vegetable Food (Cabbages and Turneps excepted), growing in the months of March and April, that will moſt increaſe the milk in Mares, Cows, and Ewes, at that ſeaſon; provided ſuch food can be cultivated at an expence that will admit of its being applied to the above purpoſes; the gold medal.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1789.

89. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1790.

90.

90. COMPARATIVE CULTURE OF THE TURNEP-ROOTED CABBAGE. To the perſon who ſhall produce to the Society the beſt account of the moſt ſatisfactory experiments, made on at leaſt four acres of land, to aſcertain the comparative advantages of the culture of the Turnep-rooted Cabbage, by ſowing it broad-caſt, and hoeing out the plants, as is practiſed with the common Turnep, or by ſowing the ſeed in nurſeries, and tranſplanting the plants at proper diſtances, hoeing the intervals; the ſilver medal and ten pounds.

It is required that at leaſt two acres be cultivated in each manner, and Certificates of the culture, with an account of the ſoil, expence, and produce of each ſeparately, be produced on or before the firſt Tueſday in October, 1791.

91. The ſame premium is extended one year further.

CERTIFICATES and Accounts to be produced on or before the firſt Tueſday in October, 1792.

92. The ſame premium is extended one year further.

CERTIFICATES and Accounts to be produced on or before the firſt Tueſday in October, 1793.

93. TURNEP-ROOTED CABBAGE. For having raiſed and duly cultivated Turnep-rooted Cabbage, in the year 1788, for the feeding Cattle or Sheep, on the greateſt number of acres, not leſs than ten, and giving an account of the ſoil, culture, time and manner of feeding off, produce, and the effects on cattle or Sheep fed with it; the gold medal.

94. For the next greateſt number of acres, not leſs than five, the ſilver medal and ten guineas.

CERTIFICATES of the quantity of land, with the accounts, to be produced on

or

or before the laſt Tueſday in October, 1789.

95. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in October, 1790.

96. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the laſt Tueſday in October, 1791.

97. CURE OF THE CURLED POTATOE. To the perſon who ſhall diſcover to the Society the nature and cauſe of the diſeaſe in the Potatoe-plant called THE CURLED POTATOE, and point out an effectual cure, the whole verified by repeated and ſatisfactory experiments, the gold medal, or thirty pounds.

The Accounts to be produced to the Society on or before the third Tueſday in November, 1789.

98. The ſame premium is extended one year further.

The accounts to be produced on or before the third Tueſday in November, 1790.

99. POTATOES FOR FEEDING CATTLE AND SHEEP. To the perſon who, in the year 1788, ſhall have cultivated the greateſt quantity of land, not leſs than four acres, with Potatoes, for the ſole purpoſe of feeding Cattle and Sheep, the gold medal, or twenty guineas.

CERTIFICATES, with ſatisfactory Accounts of the expence and manner of cultivating the Potatoes, and the application of them to the above purpoſes, and the ſucceſs that has attended the uſe of them, to be delivered to the Society on or before the ſecond Tueſday in November, 1789.

100. The ſame premium is extended one year further.

CERTI-

CERTIFICATES to be delivered on or before the ſecond Tueſday in November, 1790.

101. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the ſecond Tueſday in November, 1791.

N. B. Should any Gentleman have already cultivated Potatoes for the purpoſes mentioned in the above advertiſement, any information from him on the ſubject will be thankfully received by the Society.

102. CULTIVATING ROOTS AND HERBAGE FOR FEEDING SHEEP AND BLACK CATTLE. For the moſt ſatisfactory experiments made between Michaelmas, 1788, and the firſt of May, 1789, in order to aſcertain which of the following plants can be cultivated and houſed, or otherwiſe ſecured for winter fodder, to the greateſt advantage, viz.

Turnep-rooted Cabbage, Carrots,
Turnep Cabbage, Parſneps,
Turneps, Potatoes;
the gold medal.

The Accounts to be produced on or before the firſt Tueſday in November, 1789.

It is required that the above roots be taken off the land by the laſt day of October, 1788; that a Crop of Wheat may be ſown in the ſame ground, and the particulars of the ſowing and planting, taking up, produce, preſerving, and application to the feeding Sheep and Black Cattle, be ſpecified. The comparative experiments muſt be made between two or more of any of the above-mentioned plants, and not leſs than two acres be cultivated with each particular kind of plant.

N. B. Great advantage will ariſe to the Farmer occupying land in the neighbourhood of extenſive commons, from the conveniency of keeping large flocks of

Sheep

Sheep, and herds of Cattle, if the difficulty of ſupporting them through the winter was obviated by a due knowledge of this practice.

103. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in November, 1790.

104. STALL-FEEDING HORSES WITH GREEN VEGETABLES. To the perſon who ſhall keep the greateſt number of horſes, not fewer than four, in the Stall or Stable, during the greateſt number of months in the year, on Carrots, Potatoes, Lucern, Saintfoin, Clover, Vetches, or any other green vegetable food raiſed on land in his own poſſeſſion; the ſilver medal and ten guineas.

It is required that the number of horſes ſo fed, the quantity of land employed in raiſing the green vegetable food, the quan-

tity of hay and corn (if any) conſumed, the ſtate and condition of the horſes, and an account of the work done by them, be fully and particularly ſpecified.

The Accounts and Certificates to be produced to the Society on or before the ſecond Tueſday in February 1790.

105. STOCKS OF BEES. To the perſon who ſhall have in his poſſeſſion, being his own property, the greateſt number of Stocks of Bees, not fewer than thirty, and who ſhall in the moſt judicious manner provide for them plenty of ſuch vegetables as afford them honey and wax, the gold medal, or twenty pounds.

106. For the next greateſt number, not fewer than twenty ſtocks, the ſilver medal, or ten pounds.

Proper CERTIFICATES of the number of Stocks, and that they have been in the poſſeſſion of the Claimant during the preceding ſummer, together with a particular account

account of the vegetables provided for their ſuſtenance, and the manner in which they have been managed, to be produced to the Society on or before the firſt Tueſday in November, 1789.

107. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in November, 1790.

108. The ſame premium is extended one year further.

CERTIFICATES to be delivered on or before the laſt Tueſday in November, 1791.

109. CULTIVATING THE TRUE RHUBARB. For having raiſed, before the end of the year 1789, the greateſt number of plants, not leſs than three hundred, of Rheum Palmatum, or true Rhubarb, the gold medal.

110.

110. For the next greateſt number, not leſs than two hundred plants, the ſilver medal.

CERTIFICATES of the number of plants, that they ſtand at leaſt four feet aſunder, that they have been in a thriving ſtate during the preceding ſummer, with an account of the ſoil, culture, and aſpect, to be produced on or before the ſecond Tueſday in February, 1790.

111, 112. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in February, 1791.

113. RHUBARB. For the greateſt quantity of Rhubarb of Britiſh growth, not leſs than twenty pounds weight, equal to ſuch as is commonly ſold in the ſhops under the name of Turkey or Ruſſia Rhubarb; five pounds of which to be produced as a ſample, with Certificates that the remainder

mainder is of equal goodneſs, and a particular Account of the manner of culture and cure, on or before the firſt Tueſday in November, 1789; the gold medal.

114. For the next greateſt quantity, not leſs than ten pounds weight, the ſilver medal.

115, 116. The ſame premiums are extended one year further.

The Samples and Certificates to be produced on or before the firſt Tueſday in November, 1790.

117. ASCERTAINING THE COMPONENT PARTS OF ARABLE LAND. To the perſon who ſhall produce to the Society the moſt ſatisfactory ſet of experiments, to aſcertain the due proportion of the ſeveral component parts of Arable Land, in one or more counties in Great Britain, by an accurate analyſis of it; and who having made a like analyſis of ſome poor land, ſhall, by comparing the component

ponent parts of each, and thereby aſcertaining the deficiencies in the poor ſoil, improve a quantity of it not leſs than two acres, by the addition of ſuch parts as the former experiments ſhall have diſcovered to be wanting therein, and therefore probably the cauſe of its ſterility; the gold medal.

It is required that the manurings, ploughings, and crops of the improved land, be the ſame after the improvement as before; and that a minute account of the produce in each ſtate, of the weather, and of the various influencing circumſtances, together with the method made uſe of in analyſing the ſoils, be produced, with proper Certificates, and the chemical reſults of the analyſis, which are to remain the property of the Society, on or before the laſt Tueſday in November, 1789.

It is expected that a quantity not leſs than ſix pounds, of the rich, of the poor, and of the improved ſoils, be produced with the Certificates.

N. B.

N. B. Among the methods or proceſſes made uſe of by Chemiſts, and called DRY or MOIST, the latter only appears adapted to the aſcertaining the reſpective proportions of the component parts of Arable earth.—Dr. Shaw, in his Chemical Lectures; Dr. Home, in his Principles of Agriculture; Dr. George Fordyce, in his Elements of Agriculture; and Sir Torben Bergman, in his "Diſſertation ſur les Terres Géoponiques;" have treated of theſe ſubjects.

118. The ſame premium is extended one year further.

The Accounts to be produced on or before the laſt Tueſday in November, 1790.

119. The ſame premium is extended one year further.

The Accounts to be produced on or before the laſt Tueſday in November, 1791.

120.

120. The ſame premium is extended one year further.

The Accounts to be produced on or before the laſt Tueſday in November, 1792.

121. The ſame premium is extended one year further.

The Accounts to be produced on or before the laſt Tueſday in November, 1793.

122. IMPROVING LAND LYING WASTE. For the beſt Account of a method of improving any of the following ſoils, being land lying waſte or uncultivated, viz. Clay, Gravel, Sand, Chalk, Moor or Peat-earth, and Bog; verified by experiments on not leſs than ten acres of land, to be produced on or before the ſecond Tueſday in December, 1789; the gold medal, or the ſilver medal and twenty guineas, for each.

123. For the next in merit, the ſilver medal.

The

The ſoil, manner of improvement, expence, and product, are required to be fully explained.

124, 125. The ſame premiums are extended one year further.

The Accounts to be produced on or before the ſecond Tueſday in December, 1790.

126, 127. The ſame premiums are extended one year further.

The Accounts to be produced on or before the ſecond Tueſday in December, 1791.

128. MANURES. To the perſon who ſhall give the moſt ſatisfactory account, verified by accurate experiments, on what ſoil the application of Marl, Chalk, Lime, or Clay, ſeverally, as manures, be moſt beneficial; the gold medal, or the ſilver medal and twenty guineas.

It is required that each experiment be made on one acre, and that they be continued

tinued four years, the ſame kind of grain being ſown the ſame year on the ſeveral ſpots.

It is alſo required, that if different manures are compared, the experiments be made on ſimilar ſoils, lying near each other.

An Account of the nature of the ſoil, manure, and the quantity laid on, with all expences, and crops, to be delivered, with ſpecimens of the ſoil and manure, on or before the firſt Tueſday in January, 1790.

129. The ſame premium is extended one year further.

The Accounts and ſpecimens to be produced on or before the firſt Tueſday in January, 1791.

130. MANURES. For the moſt ſatisfactory ſet of experiments, to aſcertain the comparative advantages of the following Manures, uſed as Top-dreſſings, on Graſs or Corn Land, viz. Soot, Coal-Aſhes,

Aſhes, Wood-Aſhes, Lime, Night-Soil; the gold medal, or the ſilver medal and twenty guineas.

It is required that not leſs than half an acre of land be appropriated to each Manure, the ſoils ſimilar, and lying near each other; and if the Manure be uſed on Corn Land, then it is required that the ſame kind of Grain be ſown the ſame year on each ſpot; the experiments to be continued not leſs than two years.

An Account of the nature of the ſoil, quantity and expence of the Manure and Crops, with Certificates, to be produced on or before the firſt Tueſday in December, 1789.

131. The ſame premium is extended one year further.

The Account and Certificates to be produced on or before the firſt Tueſday in December, 1790.

132. IMPROVING WASTE MOORS. For the improvement of the greateſt number of acres of Waſte Moor Land, not leſs than one hundred, the gold medal.

It is required that the land before improvement be abſolutely uncultivated, in a great meaſure uſeleſs, not let to any tenant, and without any building upon it except cottages or huts; that in its improved ſtate it ſhall be incloſed, cultivated, and divided into fields, with buildings erected thereon ſufficient for the uſe and reſidence of a tenant.

CERTIFICATES of the number of acres, of the quality of the Moor ſo improved, of the mode and expence of the improvement, the ſtate it is in as to the proportion of graſs to arable, and the rent at which it is let, to be produced on or before the firſt Tueſday in February, 1790.

133. IMPROVING WASTE MOORS. For the improvement of the greateſt number

ber of acres of Waſte Moor Land, not leſs than one hundred, the gold medal.

It is required that the land before improvement be abſolutely uncultivated, and in a great meaſure uſeleſs; that in its improved ſtate it be incloſed, cultivated, and divided into fields, ſufficient for the uſe and occupation of a tenant.

CERTIFICATES of the number of acres, of the quality of the Moor ſo improved, of the mode and expence of the improvement, the ſtate it is in as to the proportion of graſs to arable, and the average value thereof, to be produced on or before the firſt Tueſday in February, 1791.

134. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in February, 1792.

135. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in February, 1793.

136. GAINING LAND FROM THE SEA. To the perſon who ſhall produce to the Society an account of the beſt method, verified by actual experiment, of gaining Land from the Sea, not leſs than twenty acres, on the coaſt of England or Wales, the gold medal.

CERTIFICATES of the quantity of Land, and that the experiments were begun after the firſt of January, 1784, to be produced to the Society on or before the firſt Tueſday in October, 1789.

N. B. The Society have been credibly informed, that Land has been gained on the coaſt of Holland, by fixing rows of whiſps of ſtraw upright in the ſand, at about a foot diſtant from each other, or by fixing ſtakes at proper diſtances from each other, and whatling ſtraw bands between them.

137. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1790.

138. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1791.

139. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in October, 1792.

140. MACHINE TO ANSWER THE PURPOSE OF REAPING OR MOWING CORN. For inventing a Machine to anſwer the purpoſe of mowing or reaping Wheat, Rye, Barley, Oats, or Beans, by which it may be done more expeditiouſly and cheaper than by any method now practiſed, provided it does not ſhed the Corn or Pulſe more than the methods in common practice, and that it lays the ſtraw in ſuch manner as that it may be eaſily gathered up for binding; ten guineas.

The Machine, with Certificates that at leaſt three acres have been cut by it, to be

produced to the Society on or before the ſecond Tueſday in December, 1789.

Simplicity and cheapneſs in the conſtruction will be conſidered as principal parts of its merit.

141. The ſame premium is extended one year further.

The Machine and Certificates to be produced on or before the ſecond Tueſday in December, 1790.

142. IMPROVED HOE. To the perſon who ſhall produce to the Society the moſt improved or beſt conſtructed Horſe or Hand Hoe, ſuperior to any hitherto in uſe, for the purpoſe of clearing from Weeds, and looſening the Soil in, the intermediate ſpaces of all Crops of Corn ſown in equidiſtant rows, and which ſhall earth up the young Plants at the ſame time; the gold medal, or twenty guineas.

A Hoe, with certificates of its having been ſucceſsfully uſed, to be produced to the Society on or before the firſt Tueſday in December, 1789.

143.

143. The ſame premium is extended one year further.

The Hoe, with Certificates, to be produced on or before the firſt Tueſday in December, 1790.

144. DESTROYING THE GRUB OF THE COCKCHAFER. To the perſon who ſhall diſcover to the Society an effectual method, verified by repeated and ſatisfactory trials, of deſtroying the Grub of the Cockchafer, ſo deſtructive to the roots of all ſorts of Corn, Peas, Beans, and Turneps; the ſilver medal and ten guineas.

The Accounts to be produced on or before the firſt Tueſday in January, 1790.

Premiums for Diſcoveries and Improvements in Chemiſtry, Dying, and Mineralogy.

145. KELP. For the greateſt quantity, not leſs than four tons, of Kelp, containing a much larger proportion of Alkaline Salt than any Kelp now made for ſale, twenty pounds.

A ſpecimen of one hundred weight to be produced on or before the firſt Tueſday in January, 1790; together with Certificates that the whole quantity is equal to the ſpecimen, and made in Great Britain or Ireland, of Sea Weed.

146. BARILLA. For the greateſt quantity of merchantable Barilla, not leſs than half a ton, made from Spaniſh Kali raiſed in Great Britain, the gold medal.

A ſample of not leſs than twenty-eight pounds, with a Certificate that half a ton has been made, to be produced on or before the firſt Tueſday in January, 1790.

147.

147. DISSERTATION ON ALKALI.

To the perſon who ſhall compoſe the beſt diſſertation on the nature and qualities of vegetable and mineral Alkali, containing an account of their analogy to each other, and of the moſt eſſential properties wherein they differ; together with any uſeful remarks that may have eſcaped the notice of chemical writers; explaining alſo the means of ſeparating them from each other, but more particularly from ſea ſalt, or other neutral ſalts which are frequently found united with them; ſo that, when purified, they may be advantageouſly uſed in ſuch manufactures wherein the admixture of neutral ſalts is detrimental; laſtly, an inveſtigation into the nature of their compoſition, and the method of decompounding them into their conſtituent principles; the gold medal, or fifty pounds.

The Diſſertation to be produced to the Society on or before the firſt Tueſday in March, 1790.

148.

148. PRESERVING SEEDS OF VEGETABLES. For the beſt method of preſerving the Seeds of Plants in a ſtate fit for vegetation a longer time than has hitherto been practiſed, ſuch method being ſuperior to any known to the public, and verified by ſufficient trial; to be communicated to the Society on or before the firſt Tueſday in December, 1789; the gold medal.

149. DESTROYING SMOKE. For the beſt Account, aſcertained by proper experiments, of a method of deſtroying or burning the ſmoke of fires belonging to Steam Engines, Furnaces employed in calcining or ſmelting metals, or other large works, in order to prevent annoyance to the neighbourhood; to be produced on or before the firſt Tueſday in January, 1790; the gold medal.

150. The ſame premium is extended one year further.

The

The Accounts to be produced on or before the firſt Tueſday in January, 1791.

151. CANDLES FROM RESIN. To the perſon who ſhall diſcover to the Society the beſt method of ſo reducing the inflammable quality of Reſin, as to adapt it to the purpoſes of making Candles fit for common uſe, at a price much inferior to that of Candles made of Tallow only; the gold medal, or thirty guineas.

Six pounds at leaſt of the Candles ſo prepared, with an Account of the proceſs, to be delivered to the Society on or before the firſt Tueſday in December, 1789.

152. REFINING FISH OIL. For diſcloſing to the Society an effectual method of purifying Fiſh Oil from the glutinous matter that encruſts the wicks of lamps, and extinguiſhes the light, though fully ſupplied with oil, the gold medal, or fifty guineas.

It is required that the whole of the proceſs be fully and fairly diſcloſed, in order that

that ſatisfactory experiments may be made by the Society to determine the validity of the claim; and that Certificates that not leſs than twenty gallons have been purified according to the proceſs delivered in, muſt, together with two gallons of the Oil in its unpurified ſtate, and two gallons ſo refined, be produced to the Society on or before the ſecond Tueſday in February, 1790.

The ſame premium is extended one year further.

CERTIFICATES and ſamples to be produced on or before the ſecond Tueſday in February, 1791.

153. SUBSTITUTE FOR, OR PREPARATION OF, YEAST. For diſcovering to the Society an effectual Subſtitute for Yeaſt, or preparation of Yeaſt, which, after being kept two months, ſhall be fit for fermenting liquors, and raiſing bread; the gold medal, or twenty pounds.

Specimens of the Subſtitute, or of the preparation of Yeaſt, ſufficient for trials, together

together with a paper ſealed up, and containing an account of the compoſition of the Subſtitute, or method of preparing the Yeaſt, to be produced on or before the laſt Tueſday in November, 1789.

154. INCREASING STEAM. To the perſon who ſhall diſcover to the Society a method, verified by actual experiments, of increaſing the quantity or the force of Steam, in Steam-Engines, with leſs fuel than is uſually employed, provided that in general the whole amount of the expences in uſing Steam Engines may be conſiderably leſſened; the gold medal, or thirty guineas.

To be communicated to the Society on or before the firſt Tueſday in January, 1790.

N. B. As it is well known there are methods of preventing the ebullition of liquids by the addition of particular matters in the boiling, it is ſubmitted to the conſideration

ſideration of the ingenious, whether, by the addition of ſome matters, or by ſome mechanical operations, the boiling and evaporation may not be increaſed.

155. The ſame premium is extended one year further.

To be communicated to the Society on or before the firſt Tueſday in January, 1791.

156. PREVENTING THE DRY-ROT IN TIMBER. To the perſon who ſhall diſcover to the Society the cauſe of the Dry-Rot in Timber, and diſcloſe a certain method of prevention ſuperior to any hitherto known, the gold medal, or the ſilver medal and ten guineas.

The Accounts of the cauſe, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the ſecond Tueſday in December, 1789.

157.

157. The ſame premium is extended one year further.

The Accounts to be produced on or before the ſecond Tueſday in December, 1790.

158. FINE BAR-IRON. To the perſon in England or Wales, who ſhall make, in the year 1788, the greateſt quantity of Bar-Iron, not leſs than ten tons, with Coak, from Coak Pigs, equal in quality to the beſt Iron imported from Sweden or Ruſſia, and as fit for converting into Steel; the gold medal.

Samples, not leſs than one hundred weight, with Certificates that the whole quantity is of equal quality, to be produced to the Society on or before the firſt Tueſday in January, 1790.

159. The ſame premium is extended one year further.

SAMPLES and CERTIFICATES to be delivered on or before the firſt Tueſday in January, 1791.

160.

160. METHOD OF PREPARING WHITE LEAD WHICH SHALL NOT BE PREJUDICIAL. To the perſon who ſhall diſcover to the Society a method of preparing White Lead, in a manner that ſhall not be prejudicial to the health of the workmen employed either in making or uſing it, and will anſwer all the purpoſes for which White Lead is at preſent uſed, fifty pounds.

A quantity of the White Lead ſo prepared, with an account of the proceſs made uſe of, and Certificates that not leſs than one ton has been manufactured in the ſame manner, to be produced to the Society on or before the ſecond Tueſday in November, 1789.

161. The ſame premium is extended one year further.

CERTIFICATES and Accounts to be produced to the Society on or before the ſecond Tueſday in November, 1790.

162. SUBSTITUTE FOR THE BASIS OF PAINT. To the perſon who ſhall produce to the Society the beſt ſubſtitute, ſuperior to any hitherto known, for the Baſis of Paint, equally proper for the purpoſe as the White Lead now employed; ſuch Subſtitute not to be of a noxious quality, and which may be afforded at a price not materially higher than that of White Lead; thirty pounds.

A quantity of the Subſtitute, not leſs than fifty pounds weight, with an Account of the proceſs uſed in preparing it, and Certificates that at leaſt five hundred weight has been manufactured, to be produced to the Society on or before the ſecond Tueſday in November, 1789.

163. The ſame premium is extended one year further.

CERTIFICATES and Accounts to be produced on or before the ſecond Tueſday in November, 1790.

164. REFINING BLOCK TIN. To the perſon who ſhall diſcover to the Society the beſt method of purifying or refining *Block Tin*, in ſuch manner as to render it fit for the finer purpoſes to which *Grain Tin* is now ſolely applied, the gold medal, or fifty pounds.

CERTIFICATES that not leſs than three tons have been refined or purified, with a full detail of the proceſs, and a quantity, not leſs than one hundred weight, of the Tin ſo refined, to be produced to the Society on or before the firſt Tueſday in November, 1790.

Premiums

Premiums for promoting the Polite Arts.

165. HONORARY PREMIUMS FOR DRAWINGS. For the beſt Drawing of any kind, made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Biſter, by young Gentlemen under the age of twenty-one, ſons or grandſons of Peers, or Peereſſes in their own right, of Great Britain or Ireland; to be produced on or before the firſt Tueſday in March, 1790; the honorary medal of the Society in gold.

166. The ſame in ſilver, for the ſecond in merit.

167, 168. The ſame premiums will be given, on the like conditions, to young Ladies, daughters or grand-daughters of Peers, or Peereſſes in their own right, of Great Britain or Ireland.

169. HONORARY PREMIUMS FOR DRAWINGS. For the beſt Draw-

ings of any kind, made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Biſter, by young Gentlemen under the age of twenty-one; to be produced on or before the firſt Tueſday in March, 1790; the gold medal.

170. For the next in merit, the ſilver medal.

171, 172. The ſame premiums will be given for Drawings by young Ladies.

N. B. Perſons profeſſing any branch of the Polite Arts, or any buſineſs dependent on the arts of Deſign, or the ſons or daughters of ſuch perſons, will not not be admitted Candidates in theſe claſſes.

The

The following Premiums are offered in conformity to the Will of the late John Stock, of Hampſtead, Eſq.

173. SCULPTURE. For the beſt Model of the Buſt of his Royal Highneſs the PRINCE of WALES, as large as the life, to be produced on or before the third Tueſday in February, 1790, a ſilver medallion, with the following engraved inſcription: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampſtead, Eſq.*

A Caſt from the Model to which the Premium is adjudged, is to remain the property of the Society.

174. PORTRAIT. For the beſt Copy, in Oil Colours, of a Portrait of the late JOHN STOCK, of Hampſtead, Eſq. to be produced on or before the third Tueſday in

February, 1790, a ſilver medallion, with the following engraved inſcription: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampſtead, Eſq.*

175. DRAWINGS OF OUTLINES. For the beſt Outline after an original group or caſt, in plaſter, of Human Figures, by perſons of either ſex under the age of ſixteen, the principal figure not leſs than twelve inches; to be produced on or before the third Tueſday in February, 1790; the greater ſilver pallet.

176. For the next in merit, the leſſer ſilver pallet.

N. B. Theſe Drawings are to be made on Paper, with Chalk, Black Lead, Indian Ink, or Biſter; and the originals either to be produced to the Society, or to be referred to for their examination.

177.

177. DRAWINGS OF MACHINES. For the beſt Perſpective Drawing, by perſons of either ſex under the age of twenty-one years, of the Model of a Crane, by Mr. Bunce, in the Society's Repoſitory, ſhowing particularly the method of ſtopping the Wheel by the centrifugal force of the Ball, the greater ſilver pallet; to be produced on or before the third Tueſday in February, 1790.

N. B. Such Candidates as propoſe to make Drawings for this Premium, will be admitted by the Regiſter any day (Sundays or Wedneſdays excepted) between the hours of ten and two.

The Drawing to which the Premium is adjudged, is to remain the property of the Society.

178. DRAWINGS OF LANDSCAPES. For the beſt Drawing of a Landſcape after nature, by perſons of either ſex under twenty-one years of age, to be

produced on or before the third Tuesday in February, 1790, the greater silver pallet.

179. For the next in merit, the lesser silver pallet.

Each Candidate must mention, on the front of the Drawing, from whence the View was taken; and the Drawings must be made with Chalk, Pen, Indian Ink, or Bister.

180. HISTORICAL DRAWINGS. For the best Historical Drawing, being an original composition, of five or more Human Figures; the height of the principal Figure not less than eight inches; to be made with Crayons, Chalk, Black Lead, Pen, Indian Ink, or Bister, and to be produced on or before the third Tuesday in February, 1790; the gold pallet.

181. For the next in merit, the greater silver pallet.

182. ENGRAVING IN THE LINE MANNER. To the Engraver who ſhall produce to the Society the beſt engraved Plate, executed by himſelf, of the dimenſions of not leſs than twenty inches by ſixteen inches, containing not fewer than three Human Figures, the principal figure not leſs than twelve inches high; to be engraved in the LINE MANNER, from any old or modern Picture; the Plate to be publiſhed by the Engraver; the gold pallet, and twenty-five guineas.

The regular progreſs of the work, from the firſt Proof of the etching, to the finiſhed impreſſion of the Plate, to be produced to the Society on or before the firſt Tueſday in February, 1790.

183. The ſame premium is extended one year further.

The Impreſſions to be delivered on or before the firſt Tueſday in February, 1791.

184.

184. SURVEYS OF COUNTIES. To the perſon who, in the year 1791, ſhall complete and publiſh an accurate Survey of any one County in England or Wales, on a ſcale of not leſs than one inch to a mile, for which rewards have not already been given by the Society, the gold medal, or fifty pounds.

CERTIFICATES of the accuracy of the Survey, and that it was begun after the firſt of June, 1787, together with the Map, to be produced on or before the laſt Tueſday in January, 1792.

The Map to which the premium ſhall be adjudged, to remain the property of the Society.

N. B. The Society are already in poſſeſſion of Surveys of the following Counties, viz. Devonſhire, Derbyſhire, Somerſetſhire, Northumberland, Suffolk, Leiceſterſhire, Cumberland, and Lancaſhire,

185.

185. The ſame premium is extended one year further.

The Survey to be begun after the firſt of June, 1788, and the Map to be produced on or before the laſt Tueſday in January, 1793.

186. NATURAL HISTORY. To the Author who ſhall publiſh, in the year 1789, the Natural Hiſtory of any County of England or Wales, the gold medal, or fifty pounds.

It is required that the ſeveral natural productions, whether animal, vegetable, or mineral, peculiar to the county or found therein, be carefully and ſpecifically arranged and deſcribed, in order that the Public may be enabled to judge what Arts or Manufactures are moſt likely to ſucceed in ſuch County.

The Work to be delivered to the Society on or before the laſt Tueſday in January, 1790.

187.

187. The ſame premium is extended one year further.

The Work to be delivered to the Society on or before the laſt Tueſday in January, 1791.

CON-

CONDITIONS.

NO perſon who has gained the firſt Premium in any Claſs, will be admitted a Candidate in a Claſs of an inferior age; and no Candidate ſhall receive more than one Premium in one year; nor will they who for two ſucceſſive years ſhall gain the firſt Premium in one Claſs, be ever again admitted as Candidates in that Claſs.

No Perſon ſhall ever be admitted a Candidate in any Claſs, in which he has three times obtained the whole of the firſt Premium.

No Candidate ſhall ſend in more than one Performance in any one Claſs.

All the Claims which are produced each year before the Committee of Polite Arts (to which Premiums or Bounties are adjudged)

judged) are to remain with the Society ſix weeks after the determination, unleſs the Candidates, for particular reaſons, do apply to have their performances returned.

No Claim for a Premium in the Polite Arts will be admitted, that has obtained, or has been produced in order to obtain, a Premium, Reward, or Gratification from any other Society, or any Academy or School.

All Performances that obtain Premiums in the Polite Arts, muſt be begun after the publication of ſuch Premiums.

Purpoſely to encourage real merit, and to prevent any attempts to impoſe on the Society, by producing Drawings which ſhall have been made or retouched by any other perſon than the Candidate, the Society is reſolved upon all occaſions, with reſpect to the ſucceſsful Candidates in

Claſſes

Claſſes 175 to 181 incluſive, to prove their abilities, by requiring a ſpecimen made under the inſpection of the Committee of Polite Arts, in every inſtance where ſuch proof can be obtained.

Premiums

Premiums for encouraging and improving Manufactures.

188. SILK. For the greateſt quantity of merchantable Silk, not leſs than five pounds, produced by any one perſon in England, in the year 1789, the gold medal.

Specimens of the Silk, not leſs than one pound, with Certificates that the whole is of equal quality, and produced in England, to be delivered to the Society on or before the firſt Tueſday in January, 1790.

189. For the ſecond greateſt quantity, not leſs than two pounds, the ſilver medal.

190. MACHINE FOR CARDING SILK. For the beſt Machine, ſuperior to any now in uſe, for carding Waſte Silk equally well as by hand; to be produced, together

together with a ſpecimen of the Cardings, on or before the firſt Tueſday in November, 1789; the gold medal, or twenty pounds.

191. WEAVING FISHING-NETS. For the beſt ſpecimen of Plain Netting, for Fiſhing-Nets, not leſs than twenty yards long, and ſix feet deep, woven in a Loom, or other Machine; to be produced to the Society on or before the ſecond Tueſday in January, 1790; fifty guineas.

N. B. It is expected that the Specimen produced be made in ſuch a manner, as to be cut and joined without more loſs than uſual, that it have ſuch a plain ſelvage as the common Fiſhing Nets, and that the Knot be equally faſt with thoſe in Nets in common uſe, and as eaſily repaired.

192. A ſtrong CLOTH being prepared in SWEDEN from HOP-STALKS, or BINDS, the Society will give the gold medal, or twenty pounds, as a Premium

for the beſt and greateſt quantity of ſuch Cloth, not leſs than twenty-five yards, made in England, and produced to the Society on or before the ſecond Tueſday in December, 1789.

One pound at leaſt of the Thread to be produced with the Claim.

193. The ſame premium is extended one year further.

The Cloth and Thread to be produced to the Society on or before the ſecond Tueſday in December, 1790.

194. The ſame premium is extended one year further.

The Cloth and Thread to be produced to the Society on or before the ſecond Tueſday in December, 1791.

195. PAPER FROM RAW VEGETABLE SUBSTANCES. To the perſon in England or Wales who ſhall make the greateſt quantity, not leſs than fifty reams,

reams, of the beſt and moſt uſeful Paper, from Raw Vegetable Subſtances, twenty guineas.

CERTIFICATES of the making ſuch Paper, and one ream of the Paper, to be produced on or before the firſt Tueſday in November, 1789.

N. B. The Society are in poſſeſſion of two volumes, containing a great variety of ſpecimens of Paper made from Raw Vegetables, viz. Thiſtles, Potatoe-Haum, Poplar, Hop-Binds, &c. which volumes may be inſpected by any perſon on application to the Regiſter.

Premiums for Inventions in Mechanicks.

196. TRANSIT INSTRUMENT. To the perſon who ſhall invent and produce to the Society a cheap and portable Tranſit Inſtrument, which may eaſily be converted into a Zenith Sector, capable of being accurately and expeditiouſly adjuſted for the purpoſes of finding the Latitudes and Longitudes of places, and ſuperior to any portable Tranſit Inſtrument now in uſe; the gold medal, or thirty guineas.

To be produced on or before the laſt Tueſday in January, 1790.

197. GUN-HARPOON. For every Whale, taken by means of the Gun-Harpoon, to the perſon who firſt ſtrikes ſuch fiſh therewith, three guineas.

N. B. Proper Certificates of the taking ſuch Whales, in the year 1789, ſigned by the Maſter, or by the Mate when the Claim

is

is made by the Maſter, to be delivered to the Society on or before the laſt Tueſday in December, 1789.

198. GUN FOR THROWING HARPOONS. To the perſon who ſhall produce to the Society the beſt improvement in the conſtruction of a Gun for throwing Harpoons, ſo as to render it more manageable than thoſe at preſent in uſe; the ſilver medal, or ten guineas.

The Gun to be produced to the Society on or before the firſt Tueſday in December, 1789.

199. HARPOON TO BE THROWN BY A GUN. To the perſon who ſhall produce to the Society the beſt improvement in the conſtruction of a Harpoon to be thrown by a Gun; the Harpoon to be ſo contrived, that it may ſtrike and hold the Fiſh with more certainty and greater effect than any hitherto made uſe of; the ſilver medal, or ten guineas.

The Harpoon to be produced to the Society on or before the firſt Tueſday in December, 1789.

200. INSTRUMENT FOR THROWING HARPOONS. To the perſon who ſhall produce to the Society the beſt conſtructed Inſtrument to be uſed in the Whale Fiſhery, for throwing Harpoons with more advantage and greater effect than the Gun, or any other Inſtrument now in uſe; the ſilver medal, or ten guineas.

To be delivered to the Society on or before the firſt Tueſday in December, 1789.

201. HARPOON. For every Whale taken by means of a Harpoon ſhot from any other inſtrument than a Gun, to the perſon who firſt ſtrikes ſuch fiſh therewith, three guineas.

Proper Certificates of the taking ſuch Whales in the year 1789, ſigned by the Maſter, or by the Mate when the Claim

is

is made by the Maſter, to be delivered to the Society on or before the laſt Tueſday in December, 1789.

202. DRIVING BOLTS INTO SHIPS. To the perſon who ſhall invent and produce to the Society a Model, ſhowing a method of driving Bolts into Ships, particularly thoſe of Copper, without ſplitting the Head or bending them, with more diſpatch, in all directions, and tighter, than by any means hitherto known or in uſe; twenty guineas.

The Model to be produced to the Society on or before the firſt Tueſday in February, 1790.

203. IMPROVEMENT OF THE HAND VENTILATOR. To the perſon who ſhall produce to the Society on or before the laſt Tueſday in February, 1790, a Portable Ventilator, to be worked by hand, better adapted and more efficacious for extracting foul air from Gaols,

Priſons, and Ships, than any now known or in uſe; the gold medal, or twenty guineas.

204. CRANES FOR WHARFS. To the perſon who ſhall invent and produce to the Society a Model of a Crane for Wharfs, on a ſcale of not leſs than one inch to a foot; the conſtruction to be ſuch that the effect of the power may be varied according to the weight to be raiſed, in a manner different from any now known or in uſe, yet more ſimple and effectual; the gold medal, or twenty guineas.

To be produced on or before the firſt Tueſday in February, 1790.

205. METAL ROPE OR CHAIN. To the Perſon who ſhall have invented a Chain or Rope of Copper, or other Metal, ſuperior to any hitherto made, ſufficiently flexible to work well, and IN ALL DIRECTIONS, over pullies, and which ſhall ſerve every purpoſe of a good Hempen Rope of at leaſt two inches diameter; fifty pounds.

The

The Candidate to produce to the Society ſatisfactory Certificates that ſuch Metal Rope or Chain has been uſed to advantage in manufactories, or large works, where Hempen Ropes have been hitherto employed.

The Certificates, and a ſample of the Metal Chain or Rope, not leſs than ten yards long, to be produced to the Society on or before the firſt Tueſday in November, 1789.

Although it is well known that the effect of the wind on Horizontal Sails is greatly inferior to that on thoſe which move in a vertical direction, yet as there are ſome circumſtances and ſituations where it would be moſt convenient to erect an Horizontal Mill, the Society do therefore offer the following Premium.

206. HORIZONTAL WINDMILL. To the perſon who ſhall invent and produce

duce to the Society a Model of an Horizontal Windmill, on a ſcale of not leſs than one inch to a foot, ſuperior to thoſe already in uſe, the gold medal, or twenty guineas.

To be delivered to the Society on or before the firſt Tueſday in February, 1790.

207. HAND MILL. To the perſon who ſhall produce to the Society a better conſtructed Hand Mill, for general purpoſes, than any now known or in uſe, the ſilver medal, or ten guineas.

To be delivered to the Society on or before the laſt Tueſday in December, 1789.

208. MACHINE FOR RAISING COALS, ORE, &c. &c. To the perſon who ſhall invent a Machine for raiſing Coals, Ore, &c. from Mines, which ſhall produce the effect at a leſs expence than thoſe already known or in uſe; the gold medal, or twenty guineas.

A Model

A Model of the Machine, made on a ſcale of not leſs than one inch to a foot, to be produced to the Society on or before the ſecond Tueſday in February, 1790.

209. MACHINE FOR RAISING WATER. To the perſon who ſhall invent a Machine on a better, cheaper, and more ſimple conſtruction than any hitherto in uſe, for raiſing Water out of Wells, &c. from a depth not leſs than fifty feet; thirty guineas.

CERTIFICATES of the performance of the Machine, and a Model of it, on a ſcale of not leſs than one inch to a foot, to be produced to the Society on or before the firſt Tueſday in February, 1790.

210. MACHINE FOR CLEARING RIVERS. For the beſt Model of a Machine, ſuperior to any now in uſe, for clearing Navigable Rivers from Weeds at the leaſt expence, ten guineas.

To

To be produced to the Society on or before the firſt Tueſday in February, 1790.

211. METHOD OF EXTINGUISHING FIRES. To the perſon who ſhall produce to the Society the moſt ſpeedy and effectual method of extinguiſhing Fires in Houſes or other Buildings, ſuperior to any hitherto known or in uſe, the gold medal, or thirty guineas.

To be produced on or before the ſecond Tueſday in February, 1790.

Premiums

Premiums offered for the Advantage of the Britiſh Colonies.

212. NUTMEGS. For the greateſt quantity of merchantable Nutmegs, not leſs than five pounds weight, being the growth of his Majeſty's dominions in the Weſt Indies, and equal to thoſe imported from the Iſlands of the Eaſt-Indies; the gold medal, or one hundred pounds.

Satisfactory Certificates, from the Governor, Lieutenant-governor, Preſident of the Council, or Speaker of the Houſe of Aſſembly, of the place of growth, with an account of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the firſt Tueſday in December, 1789.

213. The ſame Premium is extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in December, 1790.

N. B. Any perſon deſirous of information on the ſubject of Nutmeg-trees, may obtain it from a Memorial on the Fructification of the Nutmeg, and the ſureſt method of cultivating it to advantage, by the King's Gardener at the Iſle of Bourbon, inſerted in Mr. Maty's Review for Auguſt 1783.

214. CINNAMON. For importing into the port of London, in the year 1790, the greateſt quantity, not leſs than twenty pounds weight, of Cinnamon, being the growth of ſome of the Iſlands in the Weſt-Indies belonging to the Crown of Great Britain, and equal in goodneſs to the Cinnamon brought from the Eaſt-Indies, the gold medal, or fifty pounds.

Samples, not leſs than two pounds weight, with Certificates that the whole quantity

quantity is equal in goodneſs; together with ſatisfactory Certificates, ſigned by the Governor, Lieutenant-governor, Preſident of the Council, or Speaker of the Houſe of Aſſembly, of the place of growth, with an account of the number of trees growing on the ſpot, their age, and the manner of culture; to be produced to the Society on or before the firſt Tueſday in January, 1791.

215. BREAD-FRUIT TREE. To the perſon who, in the year 1789, ſhall convey from the Iſlands of the South Sea, to any of the Iſlands in the Weſt Indies ſubject to the Crown of Great Britain, the greateſt number, not fewer than ſix, of one or both ſpecies of the Bread-fruit Tree, in a growing ſtate; the gold medal.

CERTIFICATES, ſigned by the Governor or Lieutenant-governor of the Iſland, of the importation of the trees, and of the ſtate they were in at the time of ſigning ſuch Certificates, to be delivered to the Society

Society on or before the ſecond Tueſday in October, 1790.

216. The ſame Premium is extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in October, 1791.

217. The ſame Premium is extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in October, 1792.

THE SOCIETY being informed that a conſiderable quantity of Oil can be obtained from the Seed of Cotton; and that, after the expreſſion of the Oil, the remaining Cake will afford a ſtrong and hearty Food for Cattle; and likewiſe, that the apparatus for the operation can be applied to the Mill for Sugar Canes, and worked in the rainy ſeaſon at a moderate expence;—have reſolved, for the foregoing reaſons, that the procuring

procuring Oil from the Seed of Cotton is a proper object of a Premium, considered as an encouragement for Planters to extend the cultivation of Cotton, an article essentially requisite to increase the manufacture of that commodity in this country.

The Society therefore offer as follows:

218. OIL FROM COTTON SEED. To the Planter in any of the British Islands of the West Indies, who shall express Oil from the Seed of Cotton, and make from the remaining Seed hard and dry Cakes, as Food for Cattle, the gold medal.

CERTIFICATES that no less than one ton of the Oil has been expressed, and five hundred weight of the Cakes obtained, to be produced to the Society, with two gallons of the Oil, and two dozen of the Cakes, together with a full account of the process, on or before the last Tuesday in November, 1789.

219. For the next greateſt quantity, not leſs than half a ton of Oil, and two dozen of the Cakes, the ſilver medal.

220. SENNA. To the perſon who ſhall import into the port of London, in the year 1789, the greateſt quantity of Senna, not leſs than two hundred weight, the growth of any of the Britiſh Iſlands in the Weſt Indies, and equal to the ALEXANDRIAN SENNA now uſed for medicinal purpoſes; the gold medal.

CERTIFICATES of the growth and method of culture to be produced to the Society on or before the firſt Tueſday in February, 1790.

221. The ſame premium is extended one year further.

CERTIFICATES to be produced on or before the firſt Tueſday in February, 1791.

222. KALI FOR BARILLA. To the perſon who ſhall cultivate in the Bahama Iſlands, or any other part of his Majeſty's

Majeſty's dominions in the Weſt Indies, in the year 1788, the greateſt quantity of land, not leſs than five acres, with Spaniſh Kali, fit for the purpoſe of making Barilla; the gold medal.

223. For the next greateſt quantity not leſs than three acres, the ſilver medal.

CERTIFICATES, ſigned by the Governor, Lieutenant-governor, or other chief Magiſtrate, of the quantity of land ſo cultivated, and of the ſtate of the Plants at the time of ſigning ſuch Certificates, to be delivered to the Society on or before the ſecond Tueſday in November, 1789.

224, 225. The ſame premiums are extended one year further.

CERTIFICATES to be delivered on or before the ſecond Tueſday in November, 1790.

226, 227. The ſame premiums are extended one year further.

CERTIFICATES to be produced on or before the ſecond Tueſday in November, 1791.

228. CASHEW GUM. To the perſon who, in the year 1789, ſhall import into the port of London, from any of the Britiſh Iſlands in the Weſt Indies, the greateſt quantity, not leſs than half a ton, of the Gum of the Caſhew Tree, which on trial has been found to anſwer the purpoſe of Gum Senegal, in Callico-printing, Silk-dying, &c. the gold medal, or thirty guineas.

A Sample, not leſs than twenty pounds weight, and Certificates that the whole quantity is of the ſame quality, and free from leaves and dirt, to be produced to the Society on or before the ſecond Tueſday in January, 1790.

229. The ſame premium is extended one year further.

CERTI-

CERTIFICATES and Samples to be produced on or before the ſecond Tueſday in January, 1791.

230. The ſame premium is extended one year further.

CERTIFICATES and Samples to be produced on or before the ſecond Tueſday in January, 1792.

Society's Office, Adelphi, May 24, 1789.

Ordered,

THAT THE SEVERAL CANDIDATES AND CLAIMANTS TO WHOM THE SOCIETY SHALL ADJUDGE PREMIUMS OR BOUNTIES, DO ATTEND AT THE SOCIETY'S OFFICE IN THE ADELPHI, ON THE LAST TUESDAY IN MAY, 1790, AT TWELVE O'CLOCK AT NOON, TO RECEIVE THE SAME; THAT DAY BEING APPOINTED BY THE SOCIETY FOR THE DISTRIBUTION OF THEIR REWARDS: AND BEFORE THAT TIME NO PREMIUM OR BOUNTY WILL BE DELIVERED, EXCEPTING TO THOSE WHO ARE OUT OF THE KINGDOM, OR PREVENTED BY UNAVOIDABLE ACCIDENTS.

IN CASES WHERE PERSONAL ATTENDANCE CANNOT BE GIVEN, DEPUTIES MAY BE SUBSTITUTED TO RECEIVE REWARDS.

GENERAL

GENERAL CONDITIONS.

NOTWITHSTANDING the Society reſerve to themſelves the power of giving, in all caſes, ſuch part only of any Premium as the Performance ſhall be adjudged to deſerve, or of withholding the whole, if there be no merit; yet the Candidates may be aſſured the Society will always judge liberally of their ſeveral Claims.

It is required, that the matters for which Premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner each Claimant thinks fit, ſuch Claimant ſending with it a paper ſealed up, having on the outſide a correſponding mark, and on the inſide the Claimant's name and addreſs: and all Candidates are to take notice, that no Claim for a Premium will be attended to, unleſs the

conditions of the Advertiſement are fully complied with.

No Papers ſhall be opened, but ſuch as ſhall gain Premiums, unleſs where it appears to the Society abſolutely neceſſary for the determination of the Claim; all the reſt ſhall be returned unopened, with the Matters to which they belong, if inquired after by their Marks, within two years; after which time, if not demanded, they ſhall be publicly burnt, unopened, at ſome meeting of the Society.

All Models of Machines, which obtain Premiums or Bounties, ſhall be the property of the Society.

All the Premiums of this Society are deſigned for that part of Great Britain called England, the dominion of Wales, and the town of Berwick upon Tweed, unleſs expreſsly mentioned to the contrary.

The

The Claims ſhall be determined as ſoon as poſſible after the delivery of the Specimens.

No perſon ſhall receive any Premium, Bounty, or Encouragement, from the Society, for any Matter for which he has obtained, or propoſes to obtain, a Patent.

A Candidate for a Premium, or a perſon applying for a Bounty, being detected in any diſengenuous method to impoſe on the Society, ſhall forfeit ſuch Premium or Bounty, and be deemed incapable of obtaining any for the future.

The Performances which each year obtain Premiums or Bounties, are to remain with the Society until the end of May, except as mentioned in the Conditions annexed to the Premiums offered for promoting the Polite Arts.

No Member of this Society ſhall be a Candidate for, or entitled to receive, any Premium,

Premium, Bounty, or Reward whatſoever, except the Honorary Medal of the Society.

Where Certificates are required to be produced in claim of Premiums, they ſhould be expreſſed, as nearly as poſſible, in the words of the reſpective advertiſements, and ſhould not be from the Candidate (ſolely), but from ſome other perſon or perſons who have a poſitive knowledge of the facts certified.

Where Premiums or Bounties are obtained in conſequence of ſpecimens produced, the Society mean to retain ſuch part of thoſe ſpecimens as they may judge neceſſary, making a reaſonable allowance for the ſame.

No Candidate ſhall be preſent at any meetings of the Society or Committees, or admitted at the Society's Rooms, after they have delivered in their Claims, until ſuch Claims are adjudged, unleſs ſummoned by the Committee.

N. B.

N. B. Any information or advice that may forward the designs of this Society for the public good, will be received thankfully, and duly considered, if communicated by letter, addressed to the Society, and directed to Mr. More, the Secretary, at the Society's Office, in the Adelphi Buildings, London.

*** In case any person should be inclined to leave a sum of money to this Society, by will, the following form is offered for that purpose:

Item. I give and bequeath unto A. B. and C. D. the sum of upon condition and to the intent that they, or one of them, do pay the same to the Collector for the time being, of a Society in London,

London, who now call themſelves the Society for the Encouragement of Arts, Manufactures, and Commerce; which ſaid ſum of I will and deſire may be paid out of my perſonal eſtate, and applied towards the carrying on the laudable deſigns of the Society.

By order of the Society,

SAMUEL MORE, Secretary.

A LIST

A

LIST

OF

CONTRIBUTING MEMBERS.

N. B. Thoſe marked with ** pay Five Guineas annually, thoſe marked with * Three Guineas annually; thoſe with P are Perpetual Members; thoſe with †† have ſerved the Office of Steward; and thoſe with † are Stewards elect.

A.

** ABERCORN, James Earl of
Aileſbury, Thomas Earl of
††Andrews, Sir Joſeph, Bart. *Shaw, Berks*
Arden, Right Honourable Sir Richard Peppar, M. P. Maſter of the Rolls
Apreece, Sir Thomas, Bart.
Arkwright, Sir Richard, *Crumford, Derbyſhire*
Abbott, Mr. Andrew, *Fleet-ſtreet*
Abbot, Lemuel Francis, Eſq. *Caroline-ſtreet, Bloomſbury*

Abdy

Abdy, Rev. Thomas, *Cooper-ſale, Eſſex*
Adair, Alexander, Eſq. *Pall-mall*
Adamſon, Mr. David, *Oxford-road*
Adam, James, Eſq. *Albemarle-ſtreet*
Adam, Robert, Eſq. F. R. and A. S. *ditto*
Adam, William, Eſq. *ditto*
Addington, William, Eſq. *Clarges-ſtreet, Piccadilly*
Affleck, Admiral Philip, *Wimpole-ſtreet, Cavendiſh-ſquare*
Affleck, Captain William, *ditto*
Agace, Mr. Daniel, *Goldſmith-ſtreet, Cheapſide*
Aguilar, Honourable Ephraim, Baron, *Broad-ſtreet Buildings*
P Alexander, Claud, Eſq.
††Allen, John, Eſq. *Clements-Inn*
††Allen, William, Eſq. *Southampton-row*
Almack, William, Eſq.
Amyatt, James, Eſq. M. P. *Margaret-ſtreet*
Anderſon, David, Eſq. *York-ſtreet, St. James's-ſquare*
Angerſtein, John Julius, Eſq. *Pall-mall*
P Anneſley, Honourable Richard, *Dublin*
Anſell, Mr. James, *Craig's-court, Charing-croſs*
P Antrobus, Edmund, Eſq. *New-ſtreet, Spring-gardens*
Armſtrong, Mr. Moſtyn John, *Norwich*
Arrow, Mr. James, *Rocheſter-row, Weſtminſter*

Artaud,

Artaud, Mr. William, *Ruſſel-ſtreet, Covent-garden*
Aſcough, George Merrick, Eſq. *New-court, Temple*
P Aſhby, Shukbrugh, Eſq. F. R. S. *Great Ormond-ſtreet*
Aſhton, Mr. Iſaac, *Arundel-ſtreet*
Aſſer, Mr. James
Atkinſon, James, Eſq. *Rood-lane*
Atkinſon, Stephen, Eſq. *ditto*
P Aubert, Alexander, Eſq. F. R. and A. S. *Auſtin-friars*
Auriol, Mr. James, *Chancery-lane*
Auſtin, William, M. D. *Cecil-ſtreet, Strand*

B.

P Bute, John Earl of
P Buchan, David Earl of, LL.D. F. R. and A. S.
Briſtol, Right Rev. Frederick Earl of, F. R. S.
Balgonie, Lord
P Barrington, Honourable Daines, F. R. and A. S. *Temple*
Bruhl, His Excellency Count de, *Dover-ſtreet*
Berchtold, Honourable Count, *Prague in Bohemia*
P Blackett, Sir Thomas, Bart.
Blacket, Sir Thomas, Bart. F. A. S. *Clarges-ſtreet*
Bridgeman, Sir Henry, Bart. M. P. *St. James's-ſquare*

Bridger,

Bridger, Sir John, *Combe, Suſſex*
Bacon, John, Eſq. R.A. *Newman-ſtreet*
††Bacon, John, Eſq. F.A.S. *Temple*
Baker, John, Eſq. *Princes-ſtreet, Spital-fields*
Baker, Mr. John, *Saliſbury-ſquare, Fleet-ſtreet*
Baker, William, Eſq. *Trinity-hall, Cambridge*
Bancroft, Edward, M. D. and F. R. S. *Charlotte-ſtreet*
P Barclay, David, Eſq. *Red-lion-ſquare*
* Barclay, Robert, Eſq. *Terrace, Clapham*
Baring, Francis, Eſq. M. P. *Mincing-lane*
Baring, John, Eſq. M. P. *ditto*
Baratty, Simon, Eſq. *Gracechurch-ſtreet*
P Barnard, Mr. William, *Deptford*
Barnard, Mr. Thomas, *Adelphi*
Barret, Mr. Bryant, *Strand*
Barron, Mr. Thomas, *Jermyn-ſtreet*
P Bartolozzi, Francis, Eſq. R. A. *North-end*
Baſtard, John P. Eſq. M. P. *Portland-place*
Bates, John, Eſq. *Wycombe-marſh, Bucks*
Batſon, Robert, Eſq. *Limehouſe*
Baverſtock, Mr. James, *Windſor*
Bax, John, Eſq. *New Broad-ſtreet, City*
Bayley, Mr. John, *High-ſtreet, Mary-le-bone*
† Baynes, John, Eſq. *Blackfriars-bridge*
Bean, Alexander, Eſq. *Drury-lane*
††Beard, John, Eſq. *Doctors-Commons*
* Beaufoy, Henry, Eſq. M. P. F. R. S. *Great George-ſtreet, Weſtminſter*

Bell,

Bell, William, Eſq. *Guernſey*
Bent, Ellis, Eſq. *Warrington*
Bennett, James, Eſq. jun. *Fenchurch-ſtreet*
Beth, Thomas, Eſq. *Inner Temple-lane*
Betteſworth, Thomas, Eſq. *Mark-lane*
Birkhead, Charles, Eſq. *Ryegate, Surry*
Biſhop, Nathaniel, Eſq. *Bedford-ſquare*
Blades, Mr. John, *Ludgate-hill*
Blackburne, John, Eſq. M. P. *Park-ſtreet, Weſtminſter*
† Blake, William, Eſq. *Alderſgate-ſtreet*
Blane, Gilbert, M. D. and F.R.S. *Sackville-ſtreet*
Blizard, Mr. William, F. R. and A. S. *Lime-ſtreet*
†† Blofeld, Thomas, Eſq. *Serjeants-Inn, Fleet-ſtreet*
Bloxam, Matthew, Eſq. Sheriff for the County of Middleſex, *George-ſtreet, Weſtminſter*
Blomefield, Major, *Shooters-hill*
P Boehm, Edmund, Eſq. *Siſe-lane*
Boileau, John Peter, Eſq. *St. James's-ſtreet*
Bond, Mr. William, *Narrow-wall, New-road, Surry*
Bontein, Captain James, *Little Tower-hill*
* Bootle, Richard Wilbraham, Eſq. M.P. F.R.S. *Bloomſbury-ſquare*
Bovi, Mr. Mariano
Boulton, Matthew, Eſq. F.R.S. *Soho, near Birmingham*
P Bowdoin, James, Eſq.
†† Boydell, John, Eſq. and Alderman, *Cheapſide*

Bramſton, Thomas Berney, Eſq. M. P. *Albemarle-ſtreet*

Bramah, Mr. Joſeph, *Piccadilly*

Braithwaite, Daniel, Eſq. F. R. and A. S. *Poſt-Office*

Brand, Thomas, Eſq. *Soho-ſquare*

Brander, Mr. James, *Angel-court, Throgmorton-ſtreet*

Bray, Mr. John, *Wardour-ſtreet, Soho*

Bridges, Kemp, jun. Eſq. *Henrietta-ſtreet, Covent-garden*

* Brereton, Owen Saluſbury, Eſq. V.P. F.R. and A. S. *Soho-ſquare*

Brehm, Major Diederick, *South Molton-ſtreet*

Brickwood, Mr. Nathaniel, *Broken-wharf, Thames-ſtreet*

P Broadhead, Theodore Henry, Eſq. *Portland-place*

Bromfield, Philip, Eſq. *Lymmington, Hants*

Brown, Mr. Joſeph, *George-yard, Lombard-ſtreet*

Browne, Iſaac Hawkins, Eſq. M.P. F.R.S.

Browne, Mr. Robert, *King's-mews*

Brownlie, John, M. D. *Carey-ſtreet, Lincoln's-Inn*

Brudenell, George Bridges, Eſq. M. P. *Great George ſtreet, Weſtminſter*

Brummell, William, Eſq. *Charles-ſtreet, Berkeley-ſquare*

Bryer, William, Eſq. *South Molton-ſtreet*

Bucknall, Thomas Skip, Eſq. *Conduit-ſtreet*

Bulcock, Mr. William, *abroad*

Burgeſs, James Bland, Eſq. M. P. *Fludyer-ſtreet*

Bullock,

Bullock, Thomas, Eſq. *Pall-mall*
Bullock, John, Eſq. *Ordnance-Office, Tower*
Burney, John, Eſq. *Somerſet-place*
Burrow, Mr. Reuben, *Eaſt-Indies*
Butts, Mr. John, *Fleet-ſtreet*
Byfield, Mr. George, *Mancheſter-buildings*

C.

**Cumberland, His Royal Highneſs Duke of
P Cardiff, John Lord, F. A. S.
Clermont, Earl
**Chaulnes, Monſier le Duc de, *Paris*
**Cavendiſh, Lord George
Compton, Lord, M. P.
Cremorne, Thomas Lord Viſcount
P Conway, Right Honourable General Henry Seymour, M.P.
Cavendiſh, Honourable Henry, F. R. and A. S. *Gower-ſtreet, Bedford-ſquare*
**Calonne, Charles Alexander de, Count d'Hannonville
Cave, Sir Thomas, Bart.
P Carnegie, Sir David, Bart. M. P.
† Collier, Sir George, M. P.
Cadell, Mr. Thomas, *Strand*
Calverley, Thomas, Eſq. *Ewell, Surry*
Cameron, Donald, Eſq. *Walbrook*
Campbell, Major General Archibald

Campbell, Duncan, Eſq. *Adelphi*
Chambers, Chriſtopher, Eſq. *Mincing-lane*
Capper, Francis Hall, Eſq. *Queen's-college, Oxford*
Carew, Reginald Pole, Eſq. M.P. *Charles-ſtreet, Berkley-ſquare*
Cazalet, Peter, Eſq. *Auſtin-friars*
Carpenter, Mr. Henry, *Panton-ſtreet, Haymarket*
Cattley, Stephen, Eſq. *Lime-ſtreet*
Chandler, Henry John, Eſq. *Bentinck-ſtreet*
Changeux, Monſieur Pierre Jacques, *Paris*
Charrington, John, Eſq. *Mile-end*
Chiſwell, Richard Muilman Trench, Eſq. *Portland-place*
Claggett, Charles, Eſq. *St. Albans-ſtreet, Pall-mall*
††Clarke, Richard, Eſq. Alderman, *Bridge-ſtreet, Blackfriars*
Clarke, Ralph, Eſq. *Robert-ſtreet, Adelphi*
Clarke, Mr. Henry, *Broad-ſtreet*
Clarke, Mr. Henry, *Gracechurch-ſtreet*
P Clark, Mr. James
Clark, Richard, Eſq. *Aldermanbury*
Cloſe, Rev. Henry John, *Ipſwich*
Coghill, John, Eſq. *Coghill-hall, Yorkſhire*
Colborne, Thomas, Eſq. *Queen Anne ſtreet, Weſt*
Cole, Mr. Martin, *Channel-row, Weſtminſter*
††Collins, Thomas, Eſq. *Berners-ſtreet*
Collins, Mr. William, *Lambeth*
Collins, Benjamin Charles, Eſq. *Saliſbury*
Colliſon, Mr. John

Combrune,

Combrune, Gideon, Esq. *Suffolk-street, Middlesex-hospital*

Compton, Mr. Henry, *Charlotte-street, Pimlico*

††Conant, Nathaniel, Esq. *Lamb's-Conduit-street*

Coney, William, Esq. *Oriel-college*

P Coningham, James, Esq. *Pancras-lane, Queen-street, Cheapside*

Cooke, Benjamin, Mus. D. *Dorset-court, Westminster*

Cooke, Rev. Mr. James, *Oxford-road*

Cooke, Mr. Charles, *Paternoster-row*

Cook, Major William, *Ormond-street*

P Cooper, Mr. John, *Portpool-street*

Cooper, Mr. Benjamin, *Clement's-lane, Lombard-street*

Cope, William, Esq. *Sanctuary, Westminster*

Copeley, Thomas, Esq. *Netherhall, near Doncaster, Yorkshire*

P Coppens, B. M. D. *Ghent, Flanders*

Cort, Henry, Esq. *Gosport*

Cotton, Charles, Esq. *Maddingley, Cambridgeshire*

Cottsford, Edward, Esq. M. P. *Bruton-street*

Coulson, Jukes, Esq. *Thames-street*

Coussmaker, Lannoy Richard, Esq. *Warnford-court*

Coussmaker, William Kops, Esq. *Hackney*

Cradock, Joseph, Esq. *Gumley, Leicestershire*

Cranke, William, Esq. *Bishopsgate-street*

Crathorne, Henry Ralph, Esq. *Yorkshire*

† Crawſhay, Richard, Eſq. *George-yard, Thames-ſtreet*
Crawſhay, William, Eſq. *George-yard, Thames-ſtreet*
Crawley, Samuel, Eſq. *Argyle-ſtreet*
Crawley, Mr. William, *Biſhopſgate-ſtreet*
Creak, Mr. William, *Cornhill*
Criſp, John, Eſq. *John-ſtreet, Adelphi*
Croft, Richard, jun. Eſq. *Pall-mall*
Cropley, Rev. William, *Weſt Ham*
Crowder, William Henry, Eſq. *Frederick's-place, Old Jewry*

D.

**Devonſhire, William duke of
**Dartmouth, William Earl of, F. R. S.
P Dolben, Sir William, Bart. V. P. M. P. *Duke-ſtreet, Weſtminſter*
Dancer, Mr. John, *Doncaſter*
Daniell, James, Eſq. *Welbeck-ſtreet*
Darch, Lieut. Col. Thomas, *Gower-ſtreet, Bedford-ſquare*
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The Plate of the Model of Mr. Hughes's Machine for twitching Wool, to face page 193.

The Plate of Mr. Harriott's Road-Harrow, to face page 204.

The Plate of Captain Pakenham's Subſtitute for a Rudder, to face page 218.